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AN ILLUSTRATED LIST OF JAPANESE FRESHWATER PLANARIANS IN COLOR

by

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The freshwater planarian fauna of the Japanese Islands has not yet received full investigation. Although our own publications on the local distribution and taxonomy of this animal group form a considerable number, it is clear that not all the geographical areas have been well investigated with regard to the occurrence of planarians (Fig. 1).

Up to the present time, nineteen species of freshwater planarians (13 in Planariidae, 2 in Kenkiidae and 4 in Dendrocoelidae) have been described in Japan. Moreover, several undetermined and several undescribed forms are also recorded.*¹ Table 1 shows an up-to-date species list for the Japanese Islands.

Concerning the modern nomenclature of freshwater planarians, two important corrective opininos have been expressed recently. In the first instance, BALL (1969. Canad. Jour. Zool., 47: 59-64) expressed his opinion that the reintroduction of the generic name *Phagocata* LEIDY, 1847, was an unnecessary complication of the nomenclature of the genus *Fonticola* KOMÁREK, 1926. As to the generic name *Phagocata* versus *Fonticola*, I am of the opinion that, as long as North American *Phagocata gracilis* and European *Fonticola* (olim *Planaria*) *olivacea* remain in the same genus, *Phagocata* has definite priority.*²

Secondly, MITCHELL (1968. Ann. Spéleol., 23: 597-620), who studied the living specimens of cave-dwelling planarians of Texas, proposed to combine the genus *Speophila* HYMAN, 1937, into the genus *Sphalloplana* DE BEAUCHAMP, 1931, and to place the genera *Kenkia* HYMAN, 1937, and *Sphalloplana* in the family Planariidae. I agree with him in abolishing the genus *Speophila*. However, I do not find it easy to agree to the opinion passed by him upon the abolishment of the family Kenkiidae. So I employ the three-family-classification in the present article. A detailed discussion of this problem

*1. Figures and photographs of some of these species will be found in the following article: KAWAKATSU 1966. Japanese freshwater planarians. The Heredity, 20 (4): 54-57 (in Japanese).

*2. I owe much to Dr. Roman KENK of Washington for the stimulating discussion of the problem.

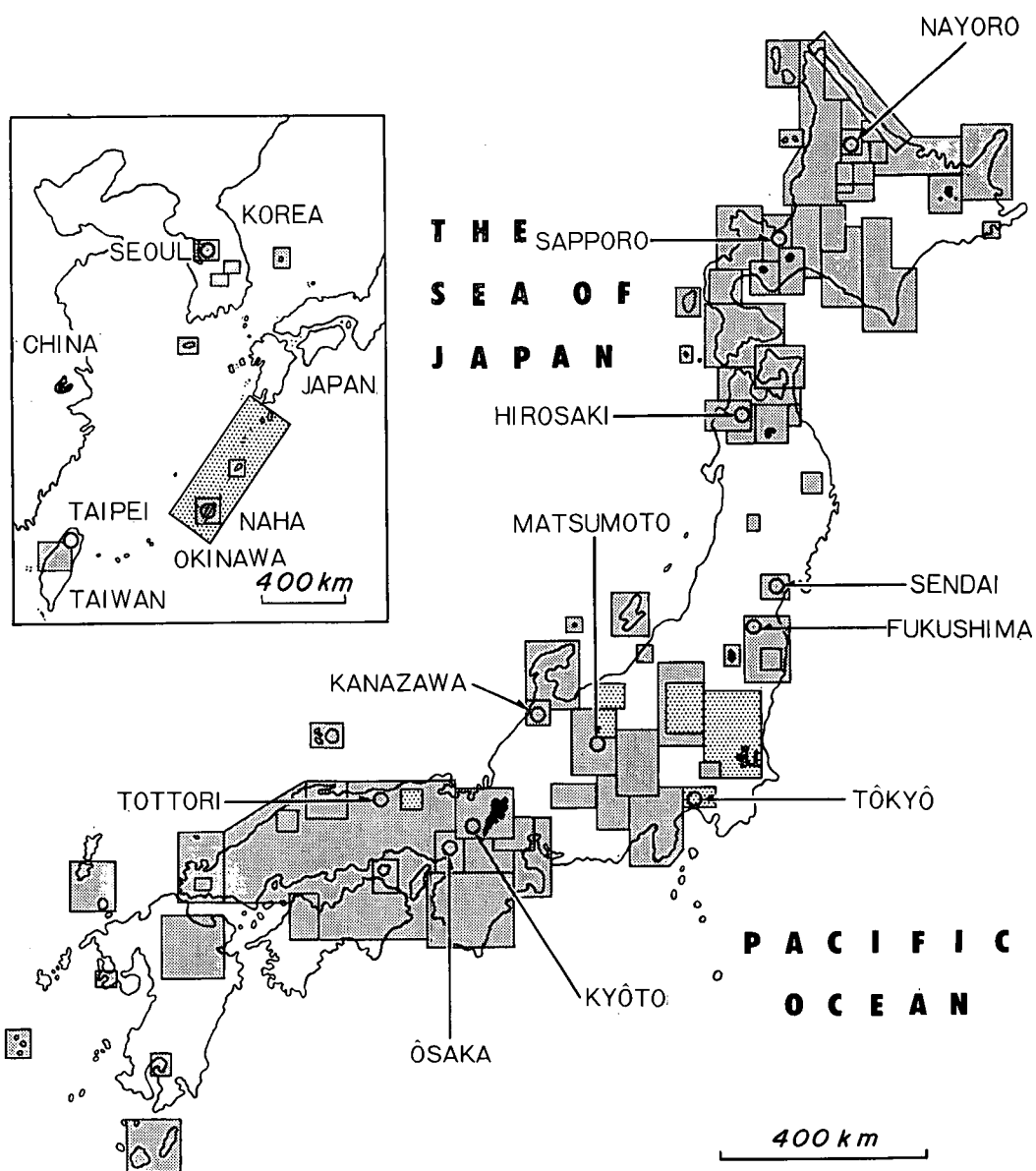


Fig. 1. Map of the Japanese Islands and its adjacent countries in the Far East, showing the areas in which the survey of distributional ecology of freshwater planarians has been done. Shaded areas are those on which articles have been provided by the members of KAWAKATSU's team. Dotted areas are those on which articles have been provided by other workers.

Table 1.

Species of Japanese freshwater planarians recorded

Class TURBELLARIA 渦虫綱	
Order TRICLADIDA 三岐腸目	
Suborder PALUDICOLA or PROBURSALIA 淡水棲三岐腸亜目	
Family PLANARIIDAE STIMPSON (KENK, 1930 emend.) プラナリア科	
Genus <i>DUGESIA</i> GIRARD, 1850 ナミウズムシ属	
1	<i>Dugesia japonica</i> ICHIKAWA et KAWAKATSU, 1964 ナミウズムシ
2	<i>Dugesia izuensis</i> KATÔ, 1943 イズウズムシ
	<i>Dugesia</i> sp. of Mt. Daisen KAWAKATSU, 1955
	* <i>Dugesia</i> sp. of Matsuyama KAWAKATSU, 1960
Genus <i>PHAGOCATA</i> LEIDY, 1847 ホソウズムシ属	
3	<i>Phagocata vivida</i> (IJIMA et KABURAKI), 1916 ミヤマウズムシ
4	<i>Phagocata kawakatsui</i> OKUGAWA, 1956 コガタウズムシ
5	<i>Phagocata teshirogii</i> ICHIKAWA et KAWAKATSU, 1962 トウホクコガタウズムシ
6	<i>Phagocata iwamai</i> ICHIKAWA et KAWAKATSU, 1962 エゾコガタウズムシ
	<i>Phagocata</i> sp. of Towada KAWAKATSU et TESHIROGI, 1968
7	* <i>Phagocata papillifera</i> (IJIMA et KABURAKI), 1916 カントウイドウズムシ
8	* <i>Phagocata albata</i> ICHIKAWA et KAWAKATSU, 1962 ソウヤイドウズムシ
9	* <i>Phagocata tenella</i> ICHIKAWA et KAWAKATSU, 1963 ヒダカホソウズムシ
	* <i>Phagocata</i> sp. of Tsushima Island ICHIKAWA et KAWAKATSU, 1962
	* <i>Phagocata</i> sp. of Asahigawa ICHIKAWA, 1954
Genus <i>POLYCELIS</i> EHRENBERG, 1831 カズメウズムシ属	
10	<i>Polycelis sapporo</i> (IJIMA et KABURAKI), 1916 キタシロカズメウズムシ
11	<i>Polycelis auriculata</i> IJIMA et KABURAKI, 1916 カズメウズムシ
12	<i>Polycelis schmidtii</i> (ZABUSOV), 1916 キタカズメウズムシ
13	<i>Polycelis akkeshi</i> ICHIKAWA et KAWAKATSU, 1963 アッケシカズメウズムシ
	<i>Polycelis</i> sp. of Rishiri & Rebun Islands KAWAKATSU, 1958
Family KENKIIDAE HYMAN, 1937 ケンキア科	
Genus <i>SPHALLOPLANA</i> DE BEAUCHAMP, 1931 ホラアナウズムシ属	
14	* <i>Sphalloplana</i> sp. of Mts. Yatsu-gadake (ICHIKAWA et KAWAKATSU), 1967
15	* <i>Sphalloplana</i> sp. of Himeji (ICHIKAWA et KAWAKATSU), 1967
Family DENDROCOELIDAE ØRSTED (KENK, 1930 emend.) デンドロシラ科	
Genus <i>BDELLOCEPHALA</i> DE MAN, 1874 オオウズムシ属	
16	+ <i>Bdellocephala annandalei</i> IJIMA et KABURAKI, 1916 ビワオオウズムシ
17	<i>Bdellocephala brunnea</i> IJIMA et KABURAKI, 1916 イズミオオウズムシ
	<i>Bdellocephala</i> sp. of Towada KAWAKATSU et TESHIROGI, 1968
	<i>Bdellocephala</i> sp. of Okushiri Island KAWAKATSU, 1958
	<i>Bdellocephala</i> sp. of Teure Island KAWAKATSU, 1958
	<i>Bdellocephala</i> sp. of Rishiri Island ICHIKAWA, 1954
Genus <i>DENDROCOELOPSIS</i> KENK, 1930 キタオオウズムシ属	
18	<i>Dendrocoelopsis ezensis</i> ICHIKAWA et OKUGAWA, 1958 エゾウズムシ
19	<i>Dendrocoelopsis lacteus</i> ICHIKAWA et OKUGAWA, 1958 キタシロウズムシ
	<i>Dendrocoelopsis</i> sp. of Otoineppu KAWAKATSU, 1965
	+ <i>Dendrocoelopsis</i> ? sp. of Lake Biwa-ko KAWAKATSU, 1966
Genus <i>MONOCOTYLUS</i> KOROTNEFF, 1912 サカズキウズムシ属 (新称)	
	<i>Monocotylus</i> ? sp. of Rishiri Island KAWAKATSU, 1958

* : Species inhabiting in subterranean water. + : True lake-dwelling species (Lake Biwa-ko).

will appear elsewhere.

There are several kinds of illustrations of Japanese freshwater planarians, such as : ICHIKAWA & KAWAKATSU (1961, Pl. I, Figs. 1-8), KABURAKI (1922, Pl. I in color, Figs. 1-16), KABURAKI (1927. "Figurado de Japanaj Bestoj", pp. 1672-1673, Figs. 3196-3199), OKUGAWA (1947. "Illustrated Encyclopedia of the Fauna of Japan", Rev. Ed., pp. 1486-1487, Figs. 4187-4191), OKUGAWA (1960. "Encyclopedia Zoologica Illustrated in Colours", IV, p. 147, Pl. 87, Figs. 10-15), and OKUGAWA (1965. "New Illustrated Encyclopedia of the Fauna of Japan", I, pp. 319-321, Figs. 32-41). None of these publications include figures of all known species of freshwater planarians in Japan. Moreover, recent nomenclatorial changes of the species and the findings of a number of new species have made these publications obsolete and urged the desirability of a new one.

Some years ago I published a brief illustrated key to the freshwater planarians of Japan (KAWAKATSU 1966 a). It was written for the Japanese biology students. Later, I published a detailed key entitled "Synopsis of the known species of freshwater planarians of Japan" (KAWAKATSU 1966 b). This publication was written for the Japanese zoologists and it includes Japanese descriptions of nineteen species of freshwater planarians which are now known in the territory of Japan. In addition to these publications, a Japanese article entitled "Illustrated list of Japanese freshwater planarians" was also published in the recent issue of the Collecting & Breeding (Tokyo), a magazine for the Japanese biology students and teachers. This publication includes brief Japanese descriptions of every known species and their figures by black-and-white paintings (KAWAKATSU 1968).

In the present publication, figures of all known Japanese species of freshwater planarians in color, as well as sketch maps showing the geographical distribution of each species based on the latest data, are shown, together with some remarks about the taxonomy and ecology. All paintings of worms were sketched from living specimens except for one species, *Dugesia izuensis* KATÔ.

I have added the present location of the type-series of the Japanese freshwater planarian species in this publication. Several years ago, I tried to locate the whereabouts of some of the type-series of the Japanese species. At that time, the late Professor Tokiô KABURAKI kindly informed me that all the type-series of turbellarian species described by himself and his co-workers were already missing in spite of his search. The type-series of *Dugesia izuensis* described by Professor Kôjirô KATÔ were also lost by a war damage of Tôkyô. The type-series of some of the other species of Japanese freshwater planarians were transferred to my hand.

For the completion of this publication I wish to express my thanks to many friends for their continuing assistance in my studies. Especially, I am indebted to the following people: Dr. Tatsuya YAMADA (Nayoro), Sister Sumie IWAKI (Sapporo), Mr. Kênji MATSUDA (Sapporo), Mr. Mineo SHIMAMURA (Hidaka), Dr. Wataru TESHIROGI (Hiro-saki), Mr. Ei'ichi FURU'UCHI (Iwaki), Mr. Isao HORIKOSHI (Mitsukaidô), Dr. S. -I. UÉNO (Tôkyô), Dr. J. -I. AOKI (Tôkyô), Dr. K. MATSUMOTO (Tôkyô), Mr. Yoshihiko HARA (Ina), Mr. Hitoshi MURAYAMA (Kashiwazaki), Dr. Yoshikazu KISHIDA (Kanazawa), Mr. Yoshihisa KANESAKI (Tsu), Mr. Motoichi YAGIHASHI (Gifu), Mr. Gen-chû ÔGAWARA (Kyôto), Mr. Yoshitsugu TARUI (Kyôto), Professor Hisao SUGINO (Ôsaka), Mr. Gorô OKAFUJI (Mine), Dr. Yoshinaka MURAKAMI (Nihama), Mr. Ichirô TANAKA (Naha), and Mr. Wun-Jai KIM (Seoul).

N. B. Literature cited in this publication will be found in KAWAKATSU's serial articles entitled "A list of publications on Japanese Turbellarians" published in the Bulletin of Fuji Women's College, Nos. 6 and 7 (1968 and 1969).

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Note added in proof : Since this manuscript went to the press, I have received the preserved specimens of *Dugesia japonica* from Shimo-no-shima of the Tsushima Islands (coll. Dr. J. -I. AOKI) on the Sea of Japan and Hachijô Island on the Pacific Ocean (coll. Dr. K. MATSUMOTO). I have also received the preserved asexual specimens of this species from Awashima Island on the Sea of Japan (coll. Mr. H. MURAYAMA). These records are shown on the map of Figure 2-b.

***Dugesia japonica* ICHIKAWA et KAWAKATSU, 1964.**

Pl. VII-a (the Matsumoto stock; asexual race) and VII-b (the Kyūshū stock; asexual race). Moderate, 10 to 30 mm in length. Capsules spherical, stalked.

Japanese name: nami-uzumushi. ナミウズムシ

Distribution: Hokkaidō (including Rebun Island and Yangeshiri Island), Honshū (including Sadogashima Island, the Okinoshima Islands, Ōmijima Island, Awajishima Island and other small islands), Shikoku, Kyūshū (including the Tsushima Islands, Tanegashima Island and Yakushima Island), the Ryūkyū (Okinawa) Islands, Taiwan, Korea, Kwantung, and North, Middle and South China (Fig. 2-a and b)

Description: ICHIKAWA & KAWAKATSU 1964. Annot. Zool. Japon., 37: 185-162, Figs. 1-4 (original description, Japan); ICHIKAWA & KAWAKATSU 1967. Nature & Life in Southeast Asia, V: 175-188, Figs. 1-4 (East China Sea area); KAWAKATSU & IWAKI 1967. Bull. Fuji Women's Coll., No. 5: 179, 185, Figs. 1-3 (the Satsunan Islands and Kagoshima); KAWAKATSU & IWAKI 1968. Bull. Fuji Women's Coll., No. 6: 129-137, Figs. 1-4 (Taiwan); KAWAKATSU, IWAKI & KIM 1967. Zool. Mag. (Tokyo), 76: 187-189, Figs. 1-2 (Quelpart Island); KAWAKATSU & KIM 1967. Zool. Mag. (Tokyo), 75: 103-107, Figs. 1-3 (Seoul in Korea); KAWAKATSU & KIM 1967. Bull. Nat. Sci. Mus. Tokyo, 10: 247-251, Fig. 1, Pl. 1, Fig. A-C, Pl. 2, Fig. A (Korea).

Dugesia japonica is a most common and eurythermic species in the Far East and will be found both in standing and slowly running waters. It is the species formerly called *Dugesia gonocephala* (DUGÈS) (misidentification). This species presents so many local variations in its morphology and physiology.

Type-series. Holotype: one set of sagittal serial sections of the Matsumoto specimen (Specimen No. 102 c, 3 slides) preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo; also 11 sets of sections (No 102 a-b, d-e and No. 286 a-g).

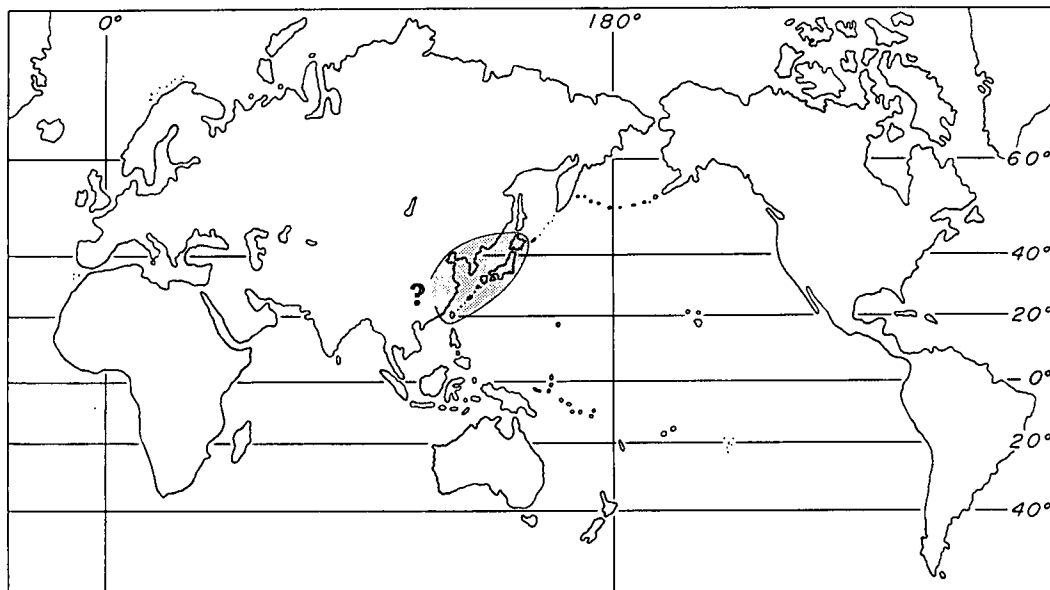


Fig. 2-a. Geographical distribution area of *Dugesia japonica* ICHIKAWA et KAWAKATSU (modified from KAWAKATSU 1964).

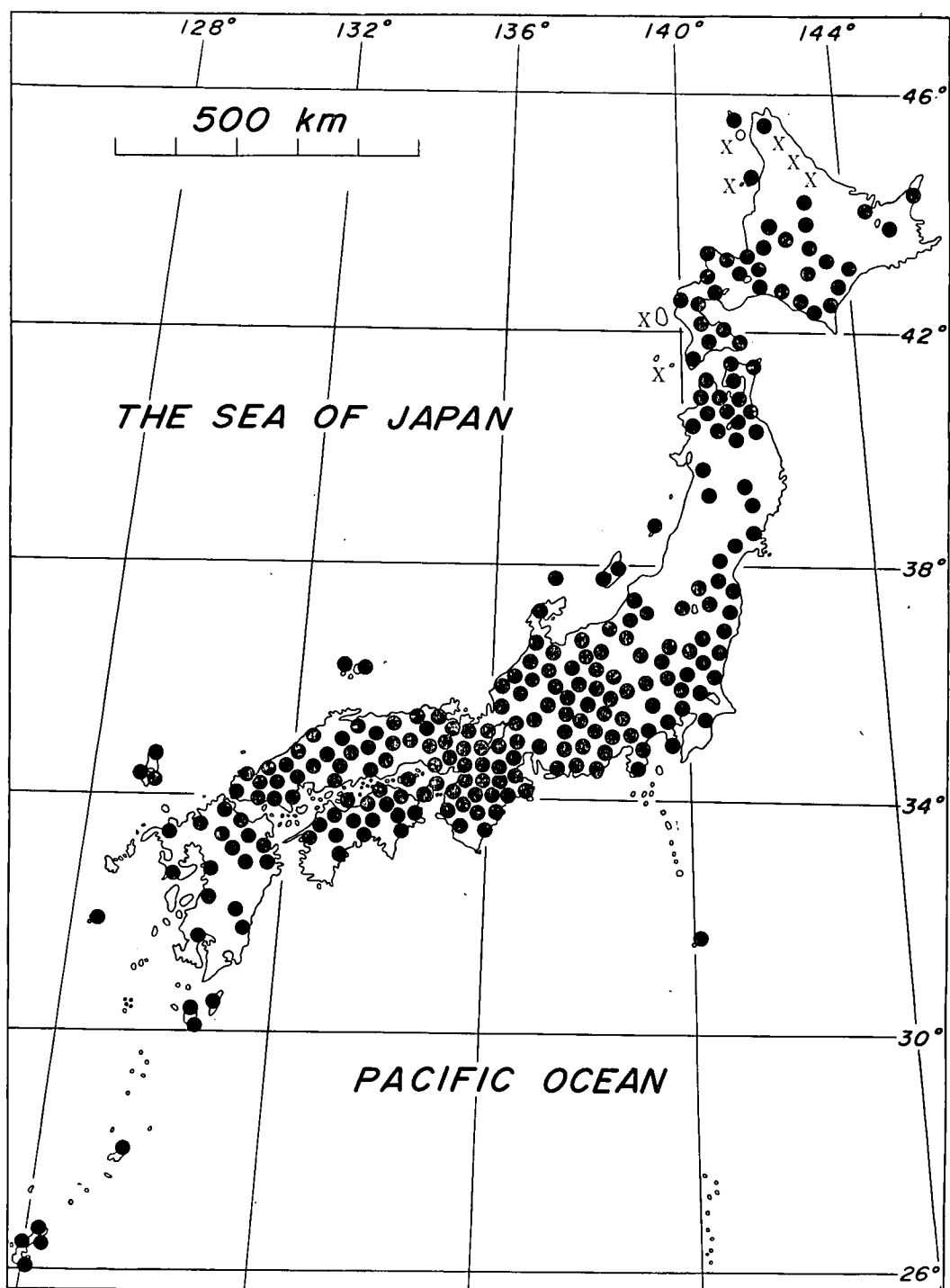


Fig. 2-b. Map of the Japanese Islands, showing the geographical distribution of *Dugesia japonica* ICHIKAWA et KAWAKATSU. Numerous localities lying close together in one district are represented by a single symbol. X: districts where the species were not distributed.

***Dugesia izuensis* KATÔ, 1943.**

Pl. VII-2. Moderate, 20-25 mm in length.

Japanese name: izu-uzumushi. イズウズムシ

Distribution: Izu Peninsula (Suzaki-chô) in Honshû (Fig. 3).

Description: KATÔ 1943. Botany & Zoology (Tokyo), 11: 629-630, Figs. 1-3. (original description in Japanese) ; KATÔ 1950. Annot. Zool. Japon., 24: 45-48, Figs. 1-2 (re-description in English).

Type-series. Holotype: lost.

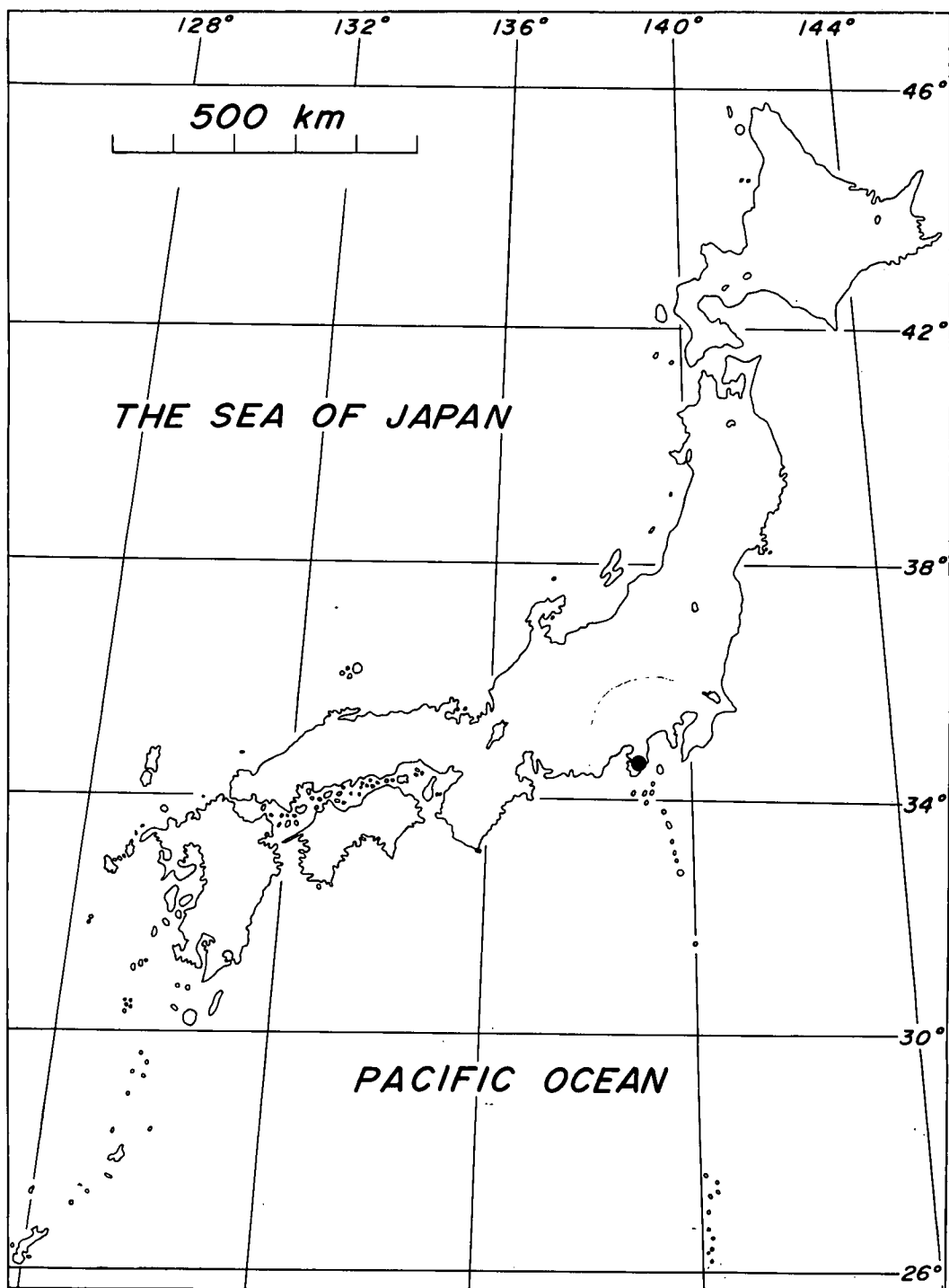


Fig. 3. Map of the Japanese Islands, showing the geographical distribution of *Dugesia izuensis* KATÔ.

***Phagocata vivida* (IJIMA et KABURAKI), 1916.**

Pl. VII-3. Moderate, 10 to 20 mm in length. Capsules spherical.

Japanese name: miyama-uzumushi. ミヤマウズムシ

Distribution: South, Middle and East Hokkaidô, Honshû (including Sadogashima Island and the Okinoshima Islands), Shikoku (including Shôdoshima Island), and Kyûshû (Fig. 4).

Description: IJIMA & KABURAKI 1916. Annot. Zool. Japon., 9: 163-165, Figs. 16-17 (original description); KABURAKI 1922. Jour. Coll. Sci. Imp. Univ. Tokyo, 44 (Art. 2): 21-31, Figs. 8-9, Pl. I, Figs. 9-11 (re-description).

Phagocata vivida is a common species in the Japanese Islands and will be found in mountain streams and cold-water springs. This species reproduces sexually by egg-laying and asexually by fragmentation.

Type-series. Holotype: lost.

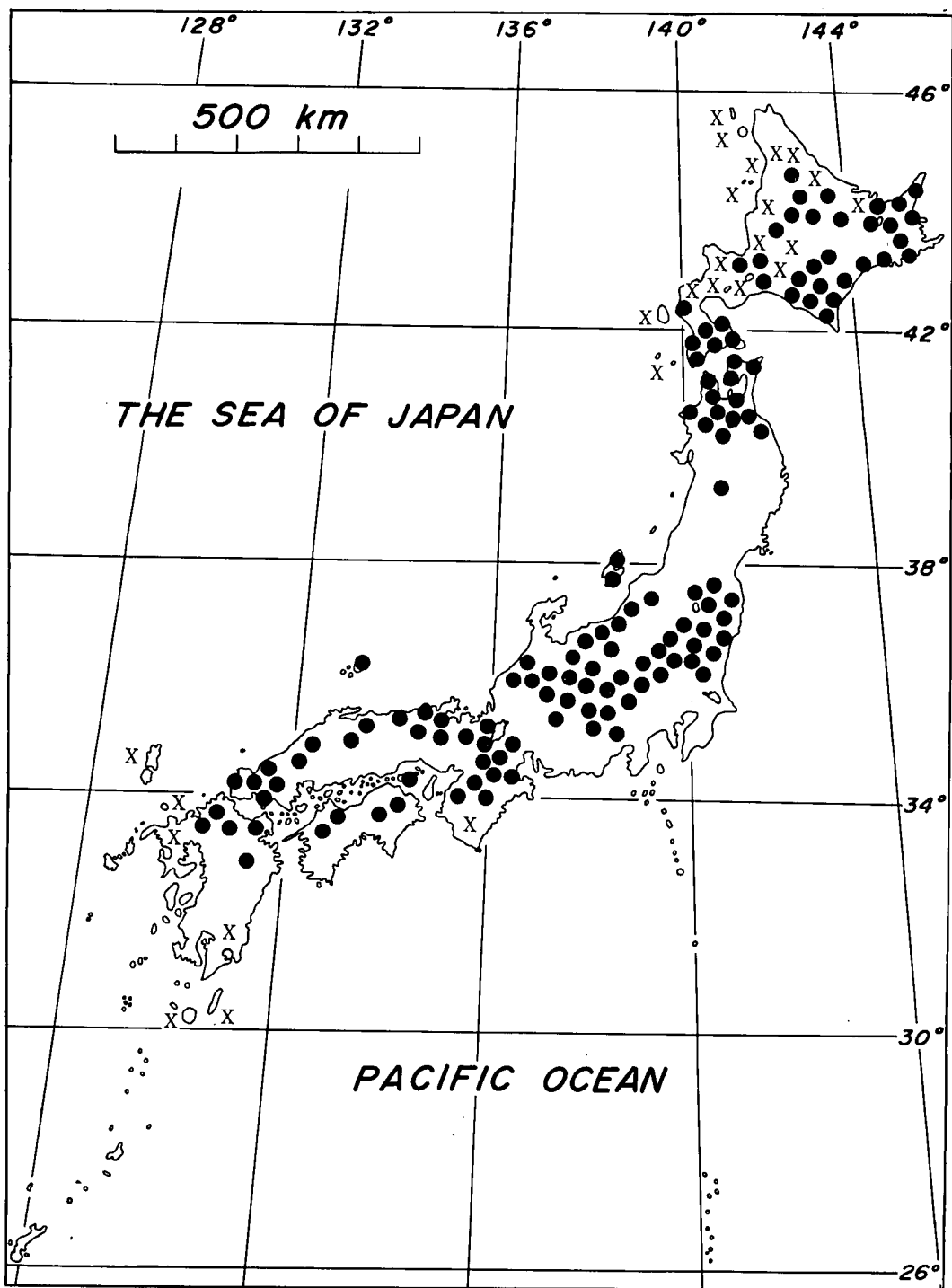


Fig. 4. Map of the Japanese Islands, showing the geographical distribution of *Phagocata vivida* (IJIMA et KABURAKI).

***Phagocata kawakatsui* OKUGAWA, 1956.**

Pl. VII-4. Small, 10 to 12 mm in length. Capsules ovoid.

Japanese name: kogata-uzumushi. コガタウズムシ

Distribution: Honshû (Kyôto, Kanazawa and Matsumoto) and Shikoku (Takamatsu) (Fig. 5).

Description: OKUGAWA 1956. Bull. Kyoto Gakugei Univ., B, No. 8: 19-22, Figs. 1-4, Photos 1-14 (original description); KAWAKATSU & IWAKI 1967. Jap. Jour. Ecol., 17: 214-224, Figs. 1-8 (re-description and remarks on ecology).

Phagocata kawakatsui will be found in spring-fed streams in the plains.

Type-series. Holotype: sections of the Kyôto (Kameoka City) specimen preserved in OKUGAWA's cabinet of Kyôto Kyôiku University in Kyôto; also several sets of sections and whole mounts. Several sets of serial sections and whole mounts of the specimens from the type locality are preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

Note added in proof: Since this manuscript went to the press, I have received the preserved specimen of *Phagocata kawakatsui* from the vicinity of Yamanaka Hot Spring near Daishôji in Ishikawa Prefecture (coll. Mr. Y. KANESAKI).

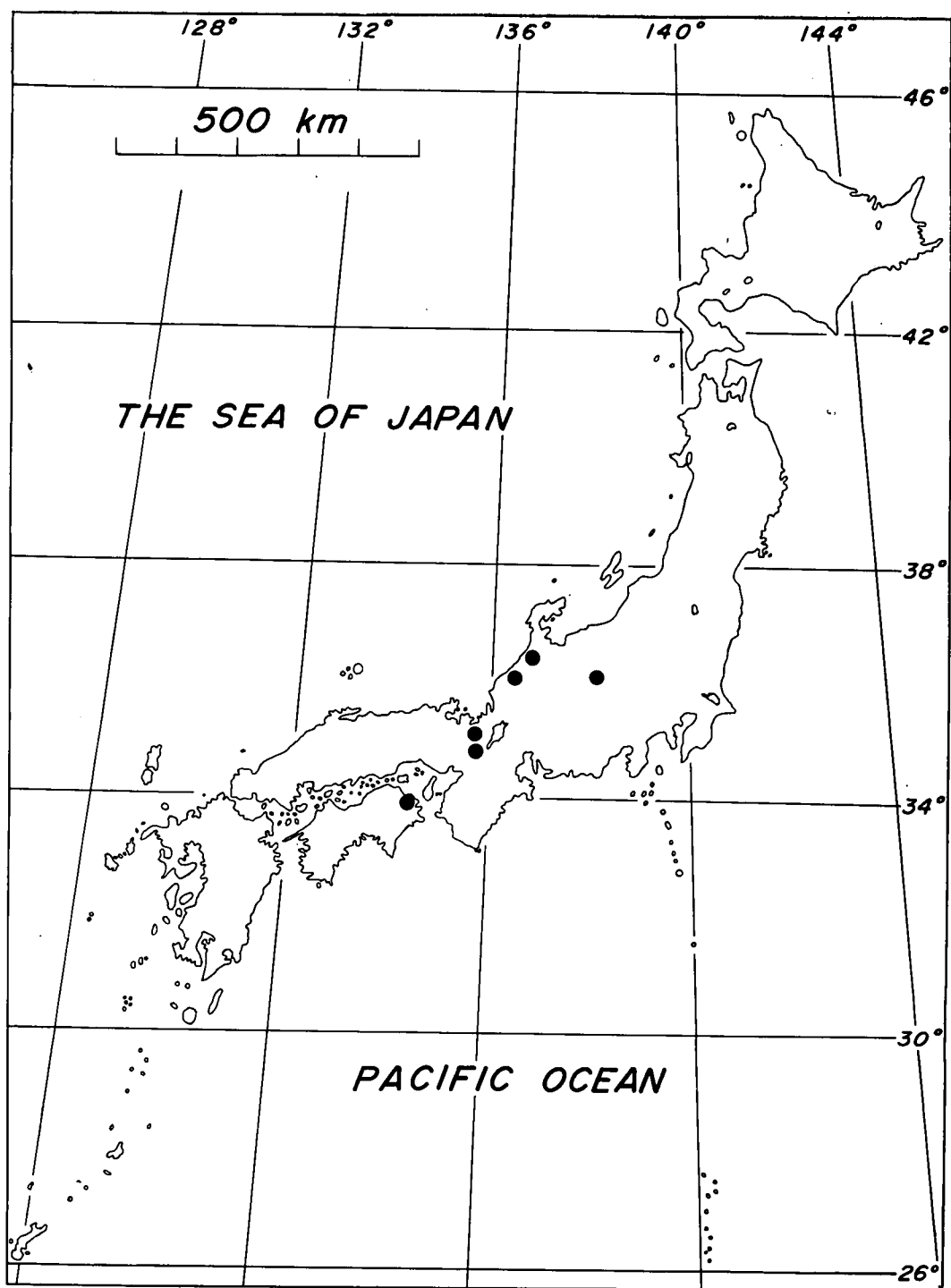


Fig. 5. Map of the Japanese Islands, showing the geographical distribution of *Phagocata kawakatsui* OKUGAWA.

***Phagocata teshirogii* ICHIKAWA et KAWAKATSU, 1962.**

Pl. VII-5. Small, 10 to 12 mm in length. Capsules ovoid.

Japanese name : tôhoku-kogata-uzumushi. トウホクコガタウズムシ

Distribution : Tôhoku Region in Honshû (Fukushima, Hirosaki, the Towada National Park, the Shimokita Peninsula and the Tusgaru Peninsula) (Fig. 6).

Description : ICHIKAWA & KAWAKATSU 1962. Annot. Zool. Japon., 35: 112-120, Figs. 1-5 (original description).

Type-series. Holotype: one set of sagittal serial sections of the Hirosaki specimen (Specimen No. 231 f, one slide) preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo; also 8 sets of sections (No. 231 a-e, g-i and No. 269 a) and whole mounts (No. 300 a-b and No. 304 a-b).

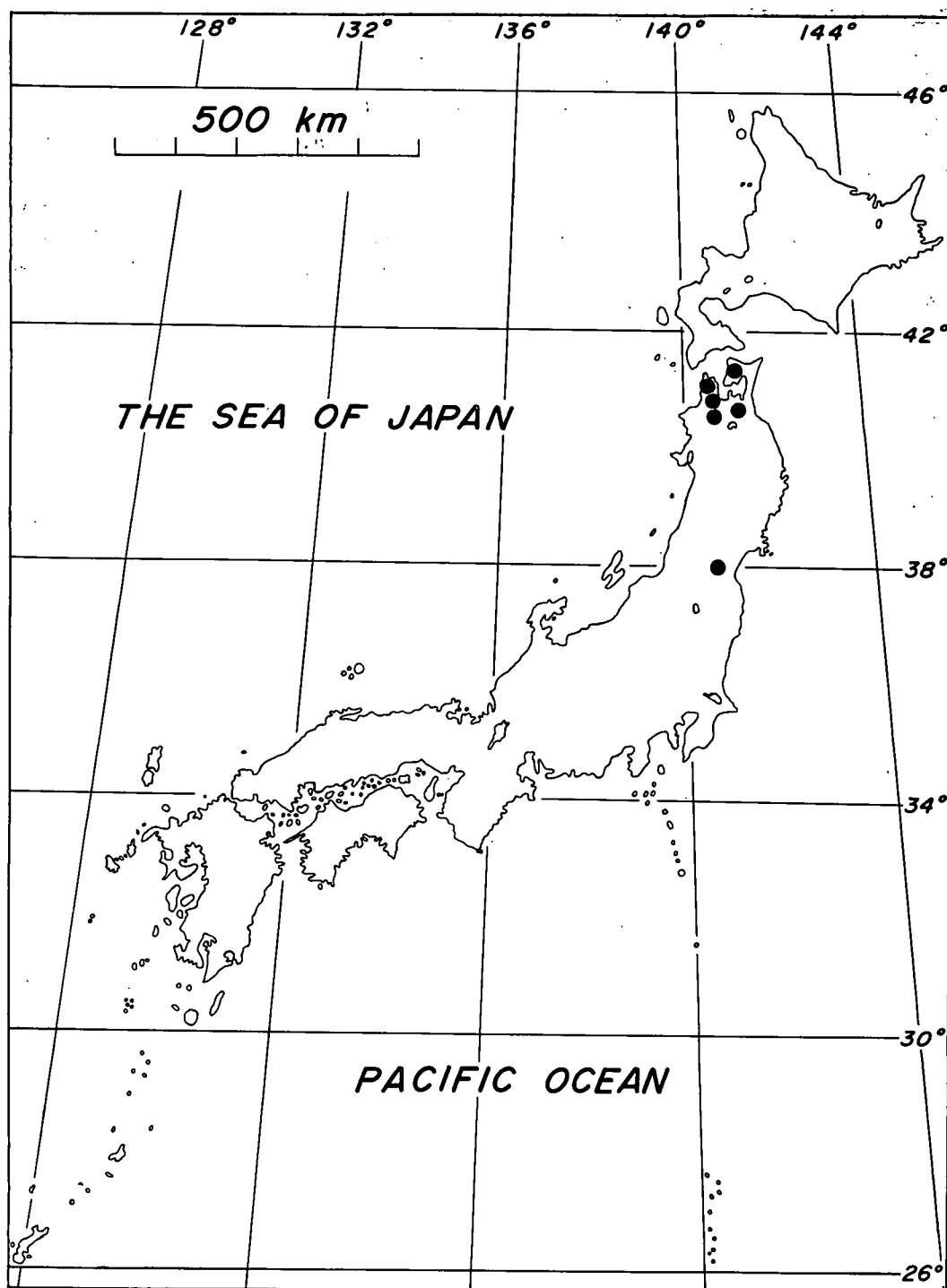


Fig. 6. Map of the Japanese Islands, showing the geographical distribution of *Phagocata teshirogii* ICHIKAWA et KAWAKATSU.

***Phagocata iwamai* ICHIKAWA et KAWAKATSU, 1962.**

Pl. VII-6. Small, 10 to 12 mm in length. Capsules ovoid.

Japanese name: ezo-kogata-uzumushi. エゾコガタウズムシ

Distribution: Hokkaidô (Sapporo, Asahigawa, Nayoro and Wakkanai) (Fig. 7).

Description: ICHIKAWA & KAWAKATSU 1962. Annot. Zool. Japon., 35: 38-46, Figs. 1-5 (original description).

Type-series. Holotype: one whole mount of the better of the Nayoro specimens (Specimen No. 299 a) preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo; also 17 sets of sections (No. 291 a-q) and 25 other whole mounts (No. 299 b-z). Twenty sets of sections of the Wakkanai specimens (No. 215 a-t) too, preserved in the same cabinet.

***Phagocata papillifera* (IJIMA et KABURAKI), 1916.**

Pl. VII-7. Small, 10 to 15 mm in length.

Japanese name: kantô-ido-uzumushi. カントウイドウズムシ

Distribution: Kantô Region (Tôkyô and Mitsukaidô) in Honshû (Fig. 8-a and b).

Description: IJIMA & KABURAKI 1916. Annot. Zool. Japon., 9: 162-163, Figs. 14-15 (original description); KABURAKI 1922. Jour. Coll. Sci. Imp. Univ. Tokyo, 44 (Art. 2): 17-21, Figs. 6-7, Pl. I, Figs. 7-8 (re-description). See KAWAKATSU & HORIKOSHI 1966. The Heredity, 20 (10): 13-16, Figs. 1-5; HORIKOSHI 1967. Collect. & Breed. (Tokyo), 29: 206-208, Figs. 1-3 (including photographs of living specimens).

Phagocata papillifera is a subterranean water species and will be found in shallow wells.

Type-series. Holotype: lost. Several sets of seral sections and whole mounts of the specimens from the Mitsukaidô locality are preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

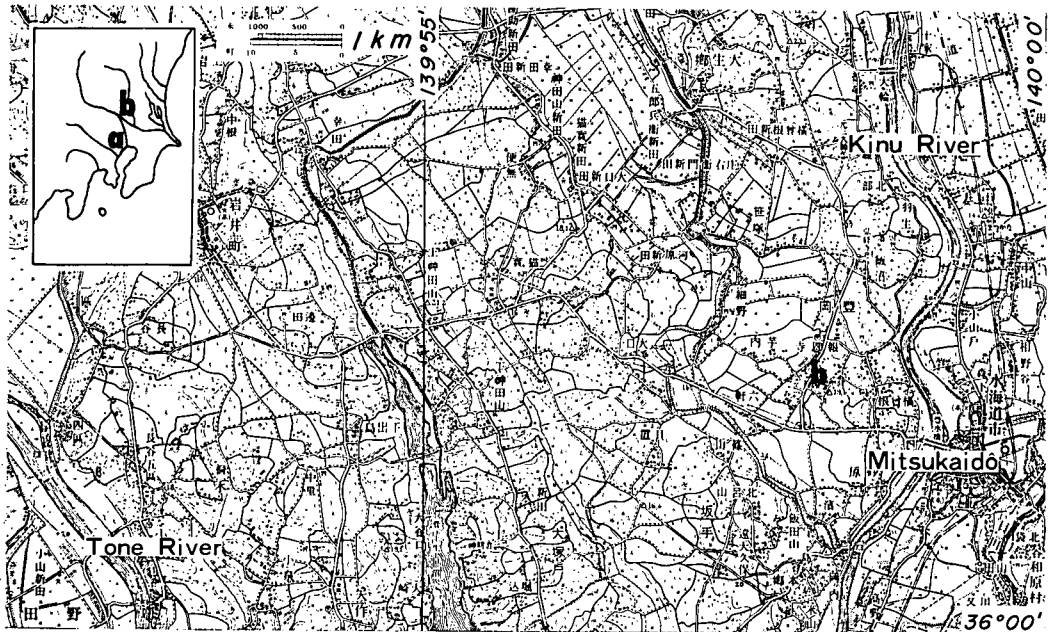


Fig. 8-a. Map showing the localities of *Phagocata papillifera* (IJIMA et KABURAKI) (after KAWAKATSU & HORIKOSHI 1966). a : the first locality (Tôkyô) ; b : the second locality (Mitsukaidô).

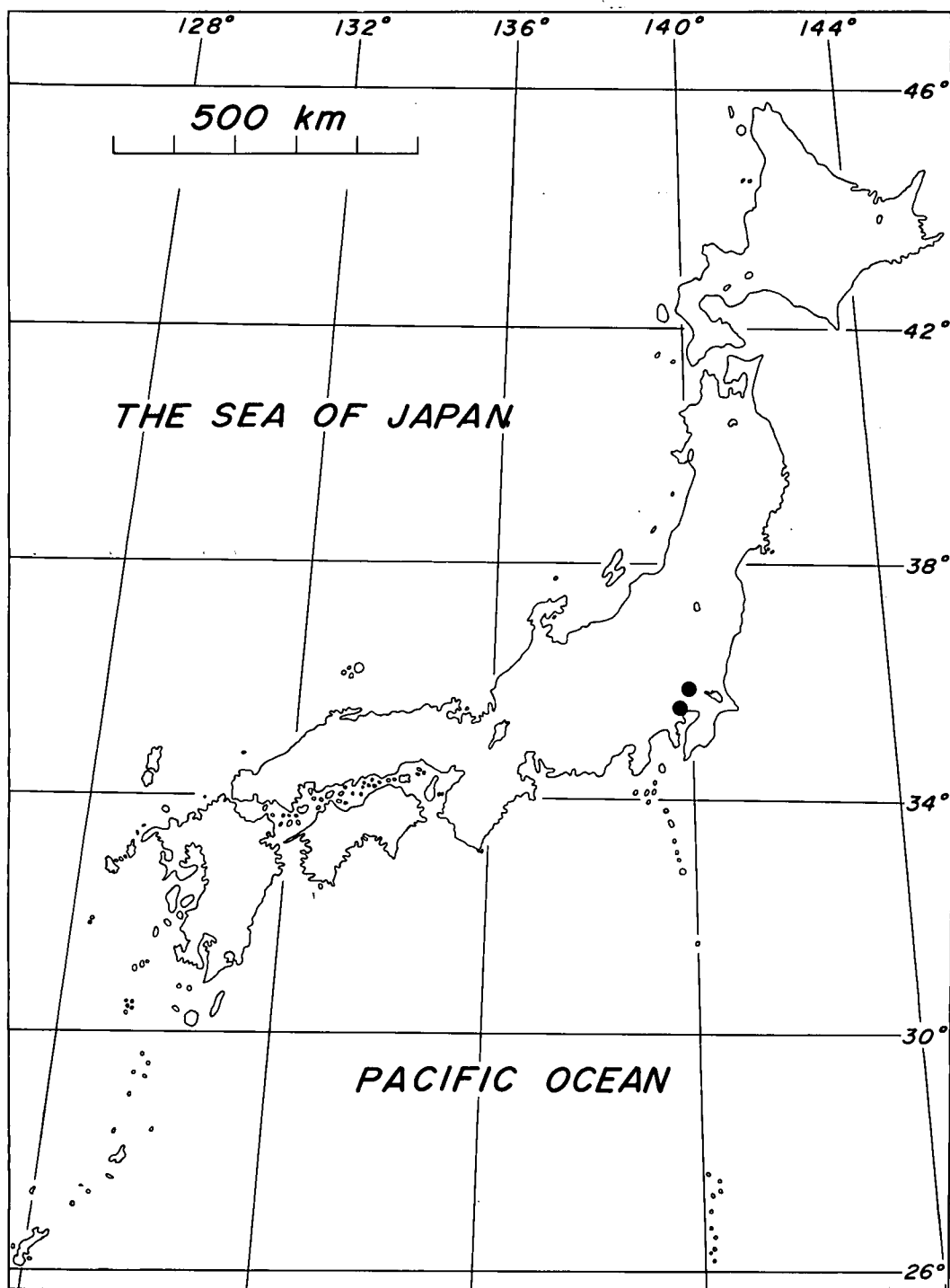


Fig. 8-b. Map of the Japanese Islands, showing the geographical distribution of *Phagocata papillifera* (IJIMA et KABURAKI).

***Phagocata albata* ICHIKAWA et KAWAKATSU, 1962.**

Pl. VII-8. Small, 8 to 12 mm in length. Capsules ovoid.

Japanese name: sôya-ido-uzumushi. ソウヤイドウズムシ

Distribution: Hokkaidô (Wassamu-chô, Toyotomi-chô and Wakkanai) (Fig. 9).

Description: ICHIKAWA & KAWAKATSU 1962. Annot. Zool. Japon., 35: 29-37, Figs. 1-5 (original description).

Phagocata albata is a subterranean water species and will be found both in shallow wells and springs.

Type-series. Holotype: one set of sagittal serial sections of the Wakkanai specimen (Specimen No. 187 c, 2 slides) preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo; also 5 sets of sections (No. 169 a and No. 187 a-b, d-e).

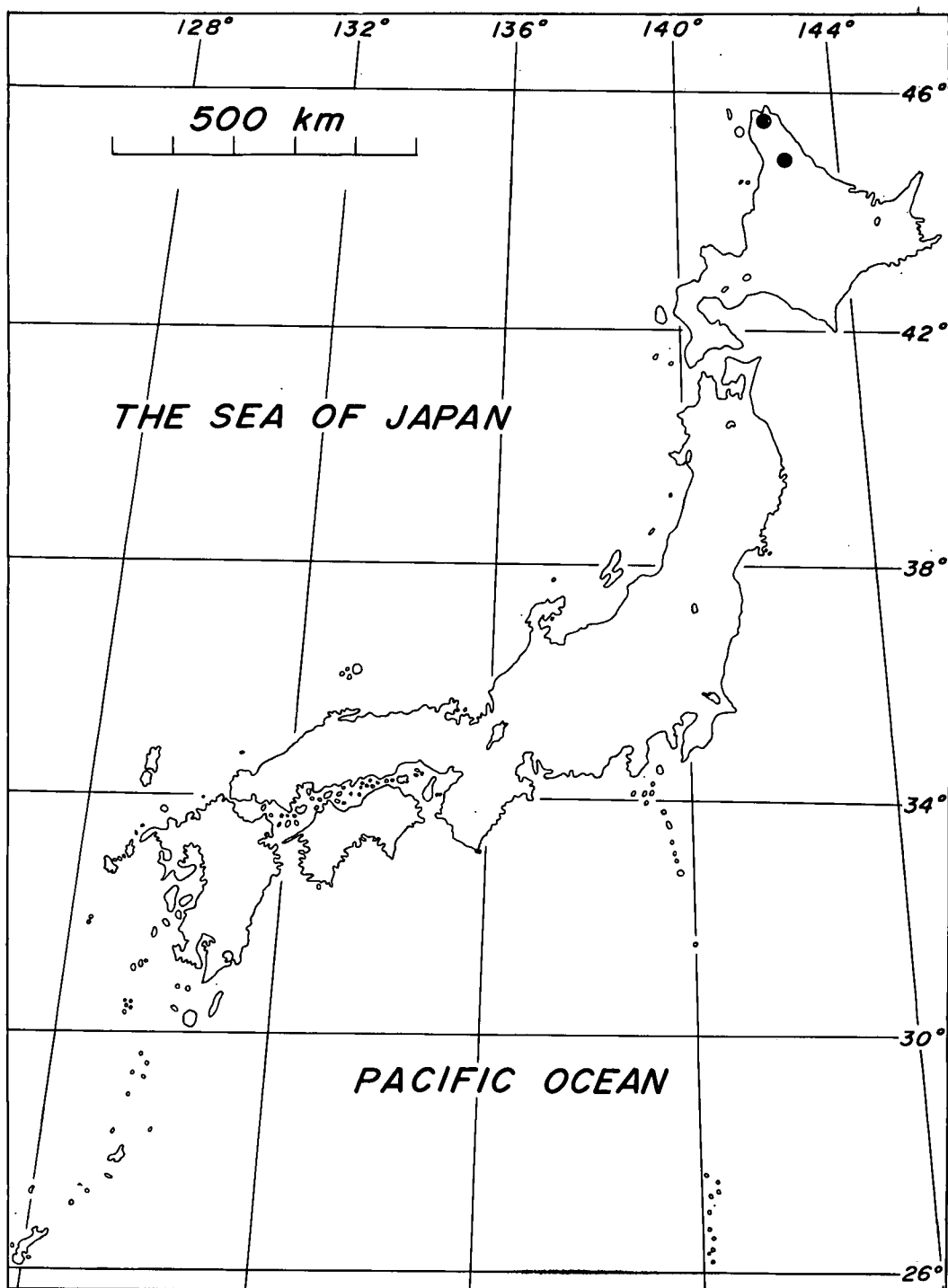


Fig. 9. Map of the Japanese Islands, showing the geographical distribution of *Phagocata albata* ICHIKAWA et KAWAKATSU.

***Phagocata tenella* ICHIKAWA et KAWAKATSU, 1963.**

Pl. VII-9. Small, 10 to 12 mm in length, and slender.

Japanese name: hidaka-hoso-uzumushi. ヒダカホソウズムシ

Distribution: Hokkaidô (Mt. Apoi in the Hidaka Mountains) (Fig. 10).

Description: ICHIKAWA & KAWAKATSU 1963. Annot. Zool. Japon., 36: 102-107, Figs. 1-3 (original description).

Phagocata tenella is a subterranean water species and will be found in springs and spring-fed streams.

Type-series. Holotype: one set of sagittal serial sections of the Mt. Apoi specimen (Specimen No. 271 c, 5 slides) preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo; also 4 sets of sections (No. 271 a-b, d-e).

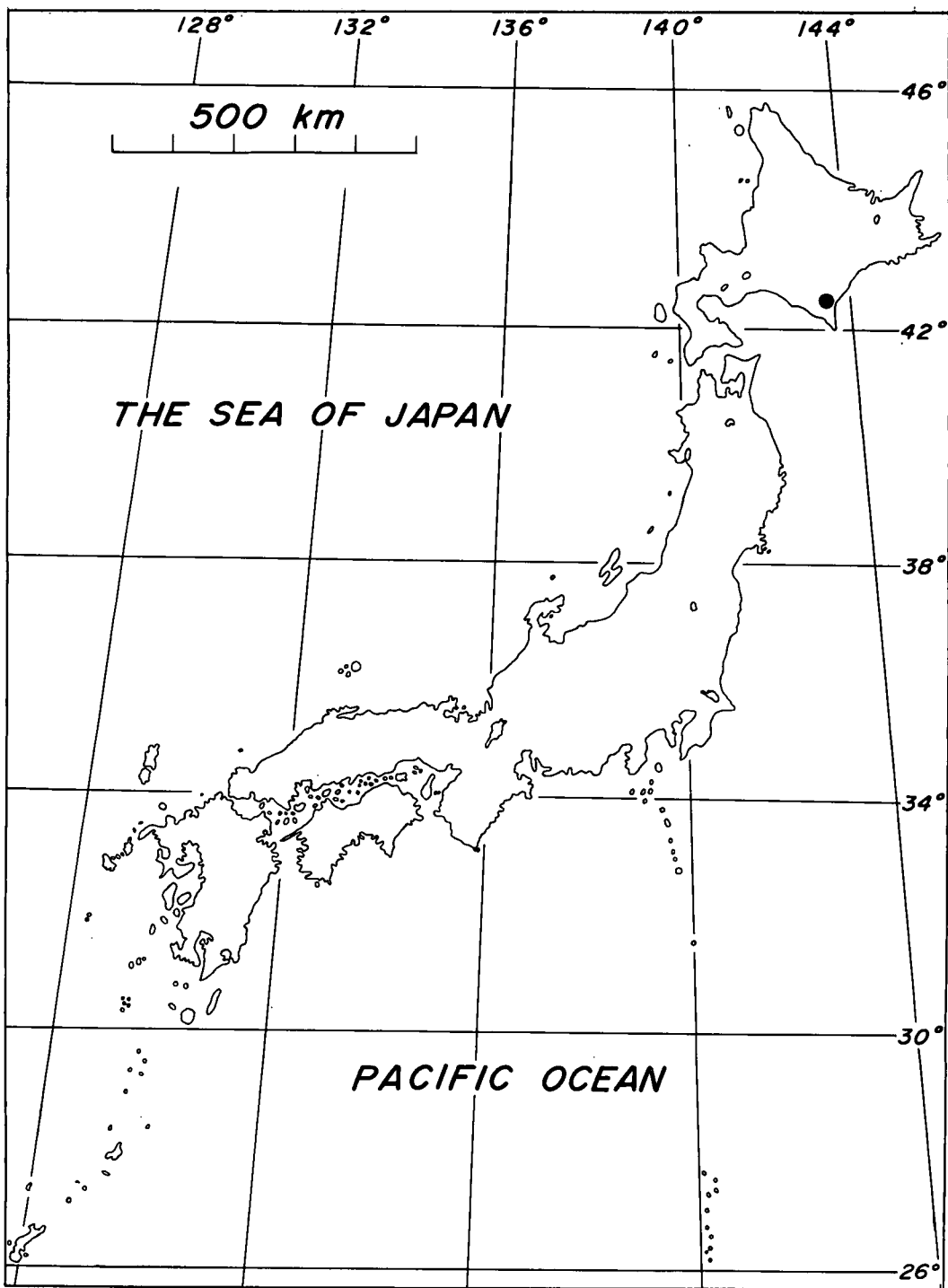


Fig. 10. Map of the Japanese Islands, showing the geographical distribution of *Phagocata tenella* ICHIKAWA et KAWAKATSU.

***Polycelis auriculata* IJIMA et KABURAKI, 1916.**

Pl. VII-10. Moderate, 15 to 25 mm in length. Capsules spherical.

Japanese name: kazume-uzumushi. カズメウズムシ

Distribution: Middle and South Hokkaidô, and North and Middle Honshû (Fig. 11-a and b).

Description: IJIMA & KABURAKI 1916. Annot. Zool. Japon., 9: 167-169, Figs. 21-22 (original description); KABURAKI 1922. Jour. Coll. Sci. Imp. Univ. Tokyo, 44 (Art. 2): 39-43, Figs. 12-13, Pl. I, Figs. 13-14 (re-description).

Polycelis auriculata is a stenothermic species and will be found in cold-water mountain streams.

Type-series. Holotype: lost.

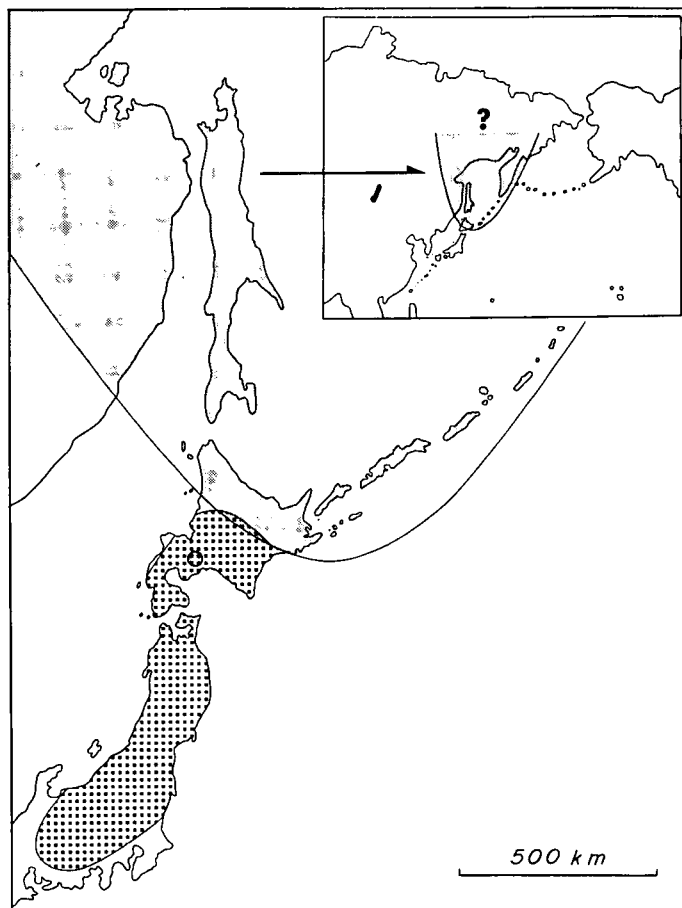


Fig. 11-a. Geographical distribution areas of *Polycelis auriculata* IJIMA et KABURAKI and *Polycelis schmidtii* (ZABUSOV) (modified from KAWAKATSU & YAMADA 1966). Dotted area: *Pol. auriculata*; shaded area: *Pol. schmidtii*.

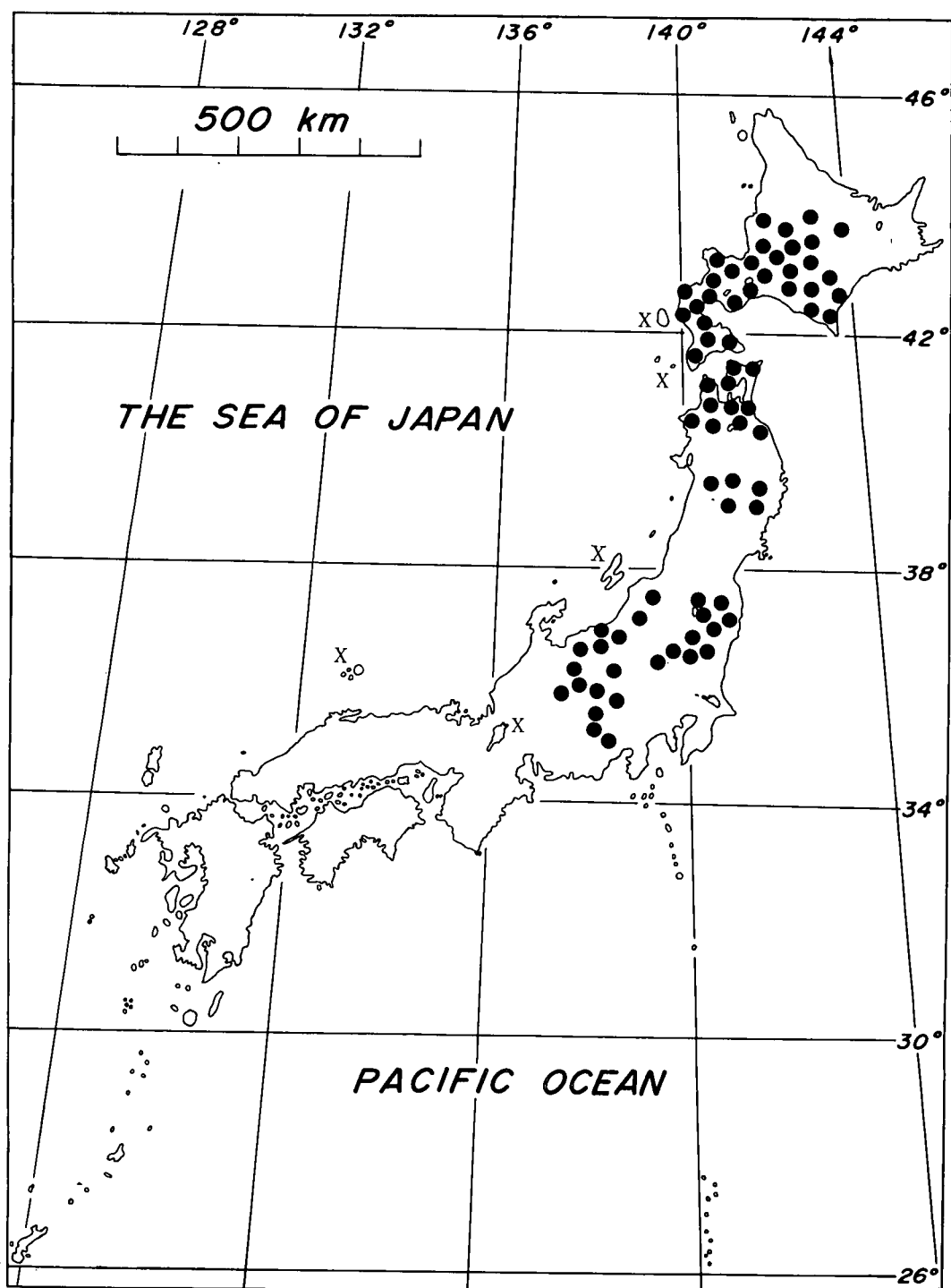


Fig. 11-b. Map of the Japanese Islands, showing the geographical distribution of *Polycelis auriculata*
Ijima et KABURAKI.

***Polycelis schmidt* (ZABUSOV), 1916.**

Pl. VII-11. Moderate, 15 to 20 mm in length. Capsules spherical.

Japanese name: kita-kazume-uzumushi, キタカズメウズムシ

Distribution: North and East Hokkaidô (including Rishiri Island) and the vicinity of Lake Shikotsu-ko in Middle Hokkaidô, Sakhalin, North and East Siberia, Kamchatca, and the Kuril Islands (Fig. 12).

Description: ZABUSOV 1916. Russ. Zool. Zhur., 1916, 1: 273-286, Figs. 1-5 (original description, Kamchatca); IJIMA 1917. Annot. Zool. Japon., 9: 327-331, Figs. 1-2 (original description of "*Polycelis ijimai*", Lake Shikotsu-ko); KABURAKI 1922. Jour. Coll. Sci. Imp. Univ. Tokyo, 44 (Art. 2): 43-47, Fig. 14, Pl. I, Fig. 15 (re-description of "*Polycelis ijimai*"); KAWAKATSU 1964. Annot. Zool. Japon., 37: 174-184, Figs. 1-6 (re-description, Hokkaidô); KAWAKATSU & YAMADA 1966. Bull. Biogeogr. Soc. Japan, 24: 1-8, Figs. 1-3 (re-description, Hokkaidô).

Polycelis schmidt is a stenothermic species and will be found in cold-water streams and springs.

Type-series. Holotype: probably preserved in the sample room of the Department of Invertebrates Zoology, Kazan State University, in Kazan (the Kamchatcan specimen). The type-series of "*Polycelis ijimai*" : lost. Several sets of serial sections and whole mounts of the specimens from Hokkaidô are preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

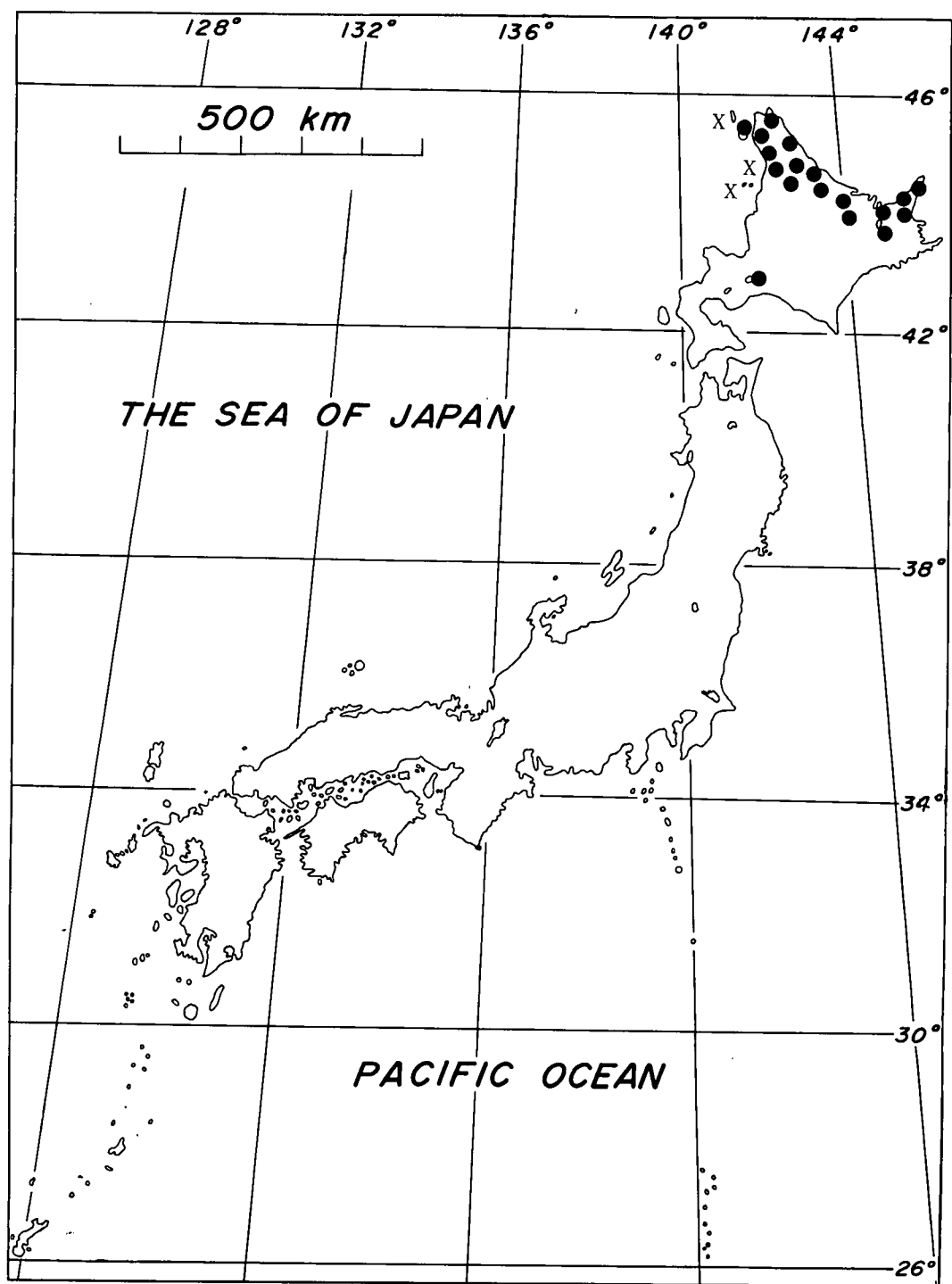


Fig. 12. Map of the Japanese Islands, showing the geographical distribution of *Polycelis schmidtii* (ZABUSOV).

***Polycelis sapporo* (IJIMA et KABURAKI), 1916.**

Pl. VIII-12. Moderate, 10 to 20 mm in length. Capsules spherical.

Japanese name: kita-shiro-kazume-uzumushi. キタシロカズメウズムシ

Distribution: Hokkaidô (including Rebun Island, Rishiri Island, Yangeshiri Island, Teure Island, Okushiri Island and Oshima-kojima Island), North Honshû (the Shimokita Peninsula and the Tsugaru Peninsula), Sakhalin, and the South Kuril Islands (Fig. 13-a and b).

Description: IJIMA & KABURAKI 1916. Annot. Zool. Japon., 9: 166-167, Figs. 19-20 (original description); KABURAKI 1922. Jour. Coll. Sci. Imp. Univ. Tokyo, 44 (Art. 2): 32-39, Figs. 10-11, Pl. I, Fig. 12 (re-description).

Polycelis sapporo is a most common species in Hokkaidô and will be found in standing and running waters almost everywhere.

Type-series. Holotype: lost. Several sets of serial sections of the specimens from the type locality (Sapporo City) are preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

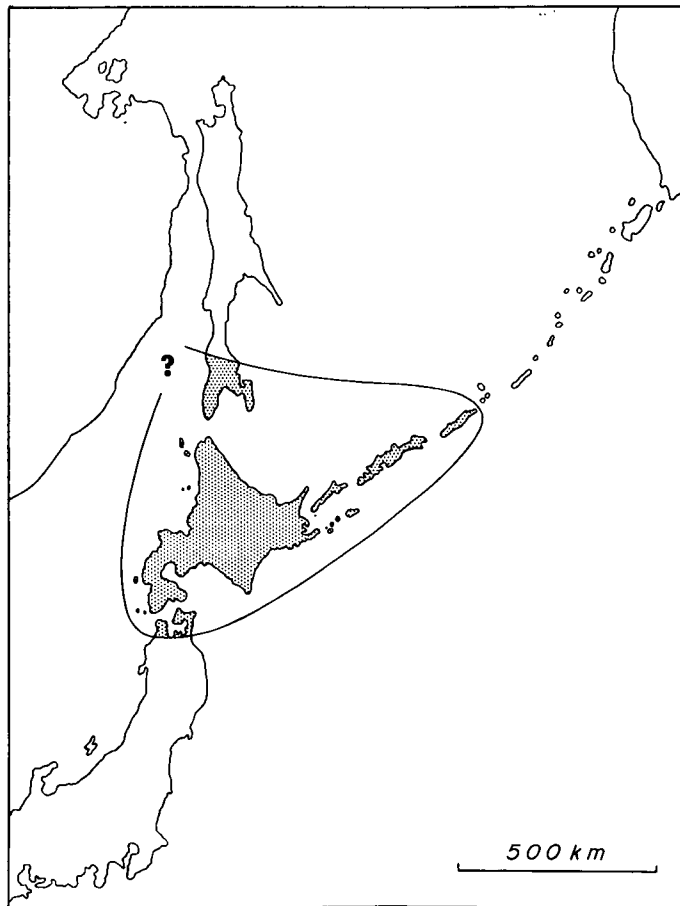


Fig. 13-a. Geographical distribution area of *Polycelis sapporo* (IJIMA et KABURAKI).

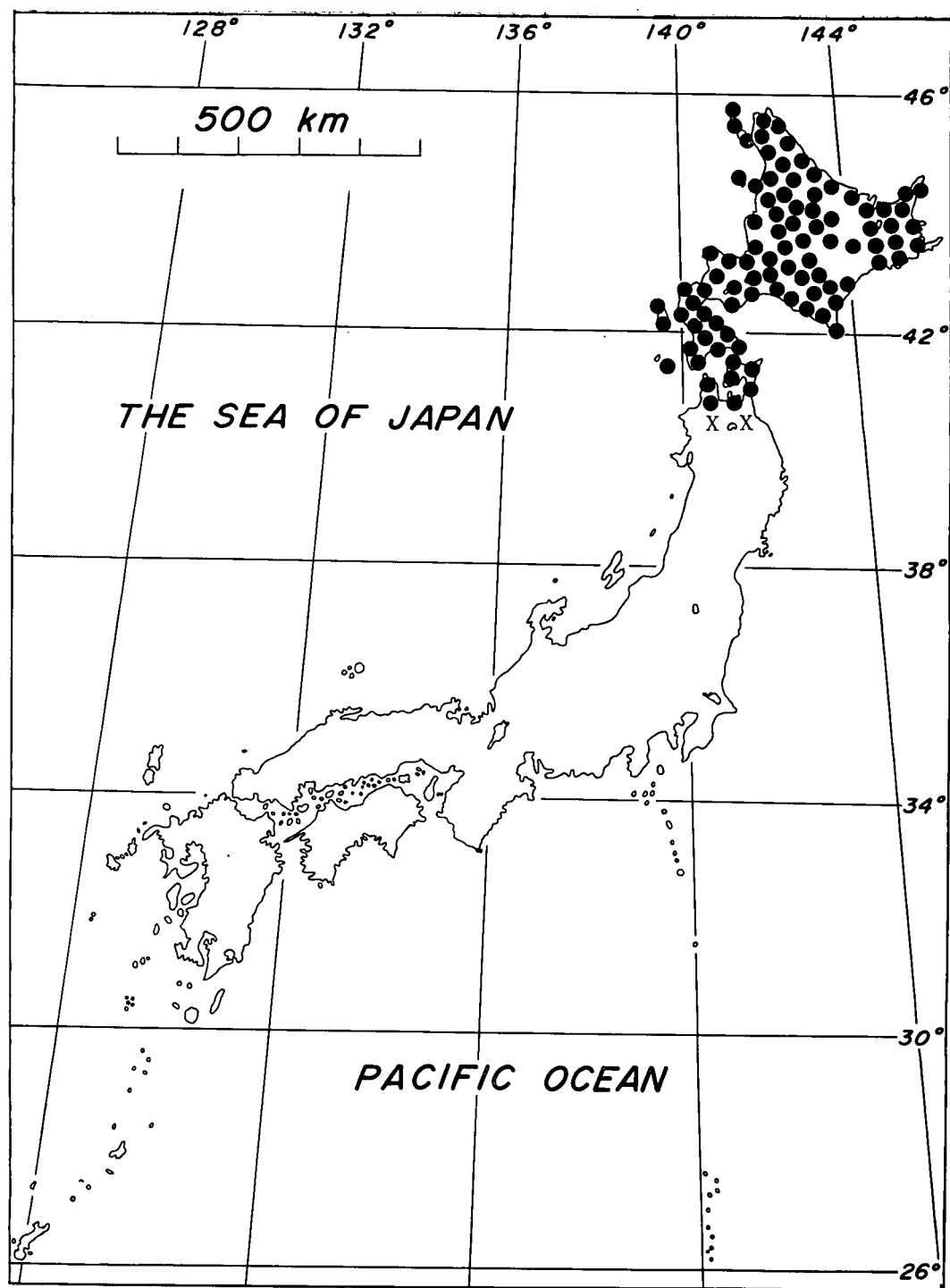


Fig. 13-b. Map of the Japanese Islands, showing the geographical distribution of *Polycelis sapporo* (IJIMA et KABURAKI).

***Polycelis akkeshi* ICHIKAWA et KAWAKATSU, 1963.**

Pl. VIII-13. Moderate, 10 to 20 mm in length. Capsules spherical.

Japanese name : akkeshi-kazume-uzumushi. アッケンカズメウズムシ

Distribution : Middle, East and North Hokkaidô (Fig. 14).

Description : ICHIKAWA & KAWAKATSU 1963. Publ. Akkeshi Mar. Biol. Stat., 12 : 1-18, Figs. 1-7 (original description).

Polycelis akkeshi will be found in slowly running waters in the plains.

Type-series. Holotype: one set of sagittal serial sections of the Akkeshi specimen (Specimen No. 314 f, 3 slides) preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo; also 13 sets of sections (No. 314 a-e, g-j and No. 341 a-d) and several whole mounts (No. 342 group). The following slides have also been preserved in the same cabinet: 12 sets of sections (No. 344 a-l) and 15 whole mounts (No. 344 group) of the Mt. Apoi specimens; 11 sets of sections (No. 321 a-k) and 1 whole mount (No. 321 l) of the Kaminayoro specimens.

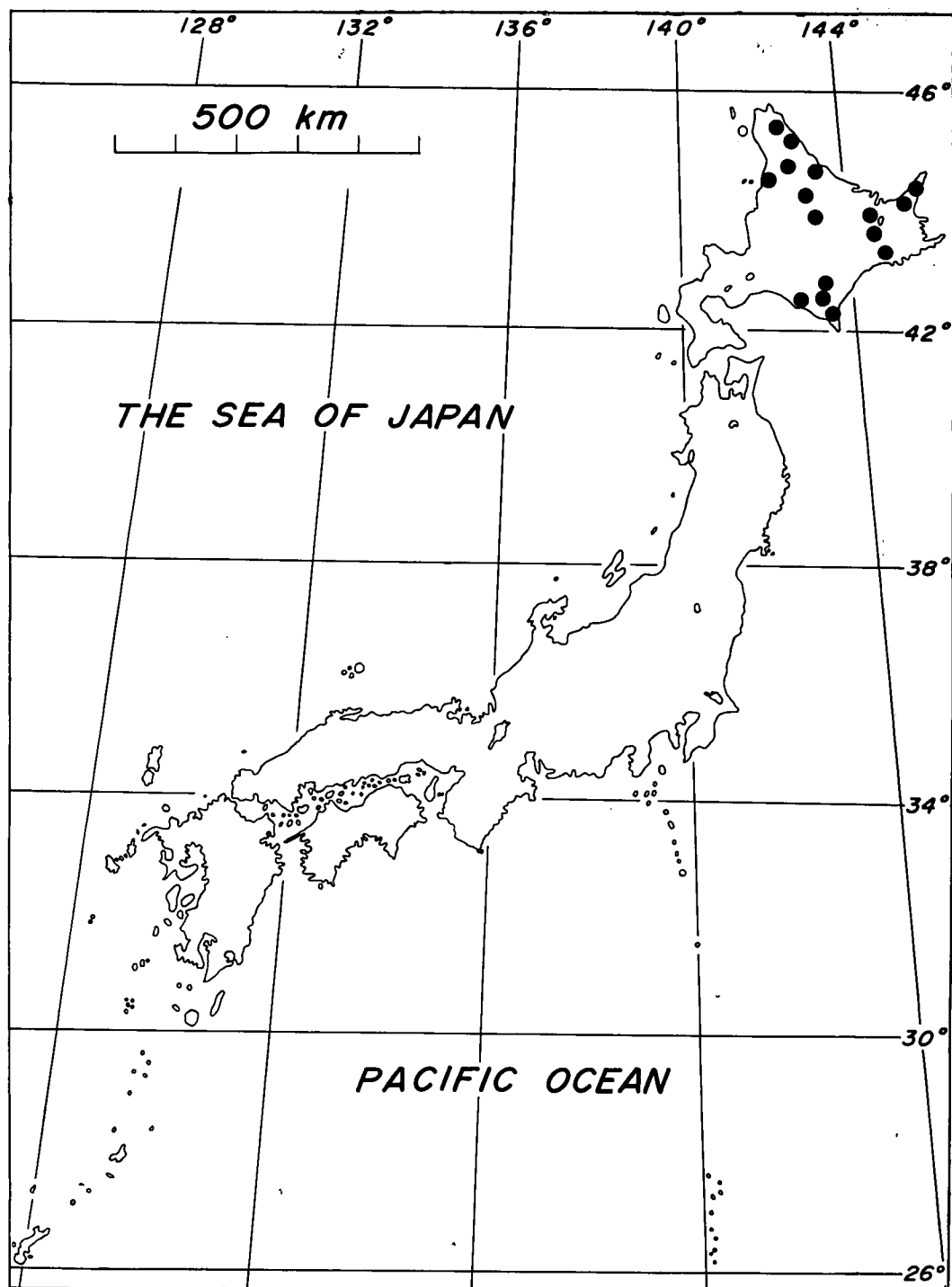


Fig. 14. Map of the Japanese Islands, showing the geographical distribution of *Polycelis akkeshi* ICHIKAWA et KAWAKATSU.

***Sphalloplana* sp. of Mts. Yatus-gadake (ICHIKAWA et KAWAKATSU), 1967**

Pl. VIII-14. Moderate, 15 mm in length. Adhesive organ well-developed.

Distribution : Middle Honshû (Mts. Yatsu-gadake) (Fig. 15).

Description : ICHIKAWA & KAWAKATSU 1967. Arch. Hydrobiol., 63 : 512-514, Fig. 1.

This form is a subterranean water species and will be found in springs.

Type-series. Material: two sets of sagittal serial sections of the Mts. Yatsu-gadake specimens (No. 50 a-b); the slides lost.

Note added in proof : Since this manuscript went to the press, a letter has been received from Mr. I. HORIKOSHI intimating that a specimen of *Sphalloplana* sp. of Mts. Yatsu-gadake was collected in the vicinity of Mt. Yamizo in the Kantô Region. The specimen had disintegrated. Judging from the Mr. HORIKOSHI's sketch of the worm made on the spot, his record of the new locality of this species may be sure. This locality is represent on the map of Figure 15 by a symbol with a question mark.

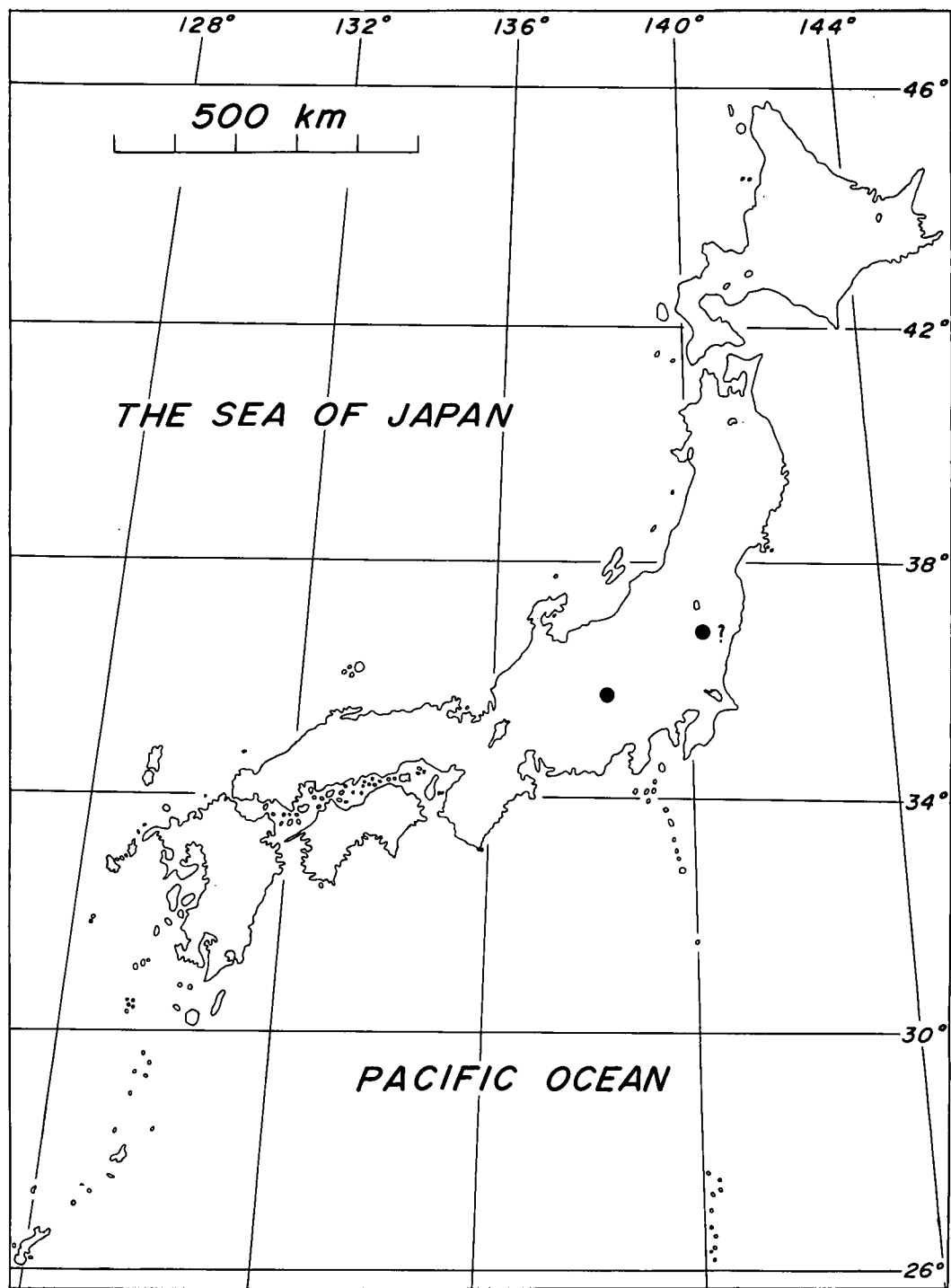


Fig. 15. Map of the Japanese Islands, showing the geographical distribution of *Sphalloplana* sp. of Mts. Yatsu-gadake (ICHIKAWA et KAWAKATSU).

***Sphalloplana* sp. of Himeji (ICHIKAWA et KAWAKATSU), 1967.**

Pl. VIII-15 a (dorsal view) and 15 b (ventral view of the head region). Small, 13 mm in length, and slender. Adhesive organ in the form of a deep tubular cavity.

Distribution : Middle Honshû (Himeji) (Fig. 16).

Description : ICHIKAWA & KAWAKATSU 1967. Arch. Hydrobiol., 63 : 514-518, Figs. 2-4.

This form is a subterranean water species and will be found in wells.

Type-series. Material : one set of sagittal serial sections of the Himeji specimen (Specimen No. 395, 3 slides) preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

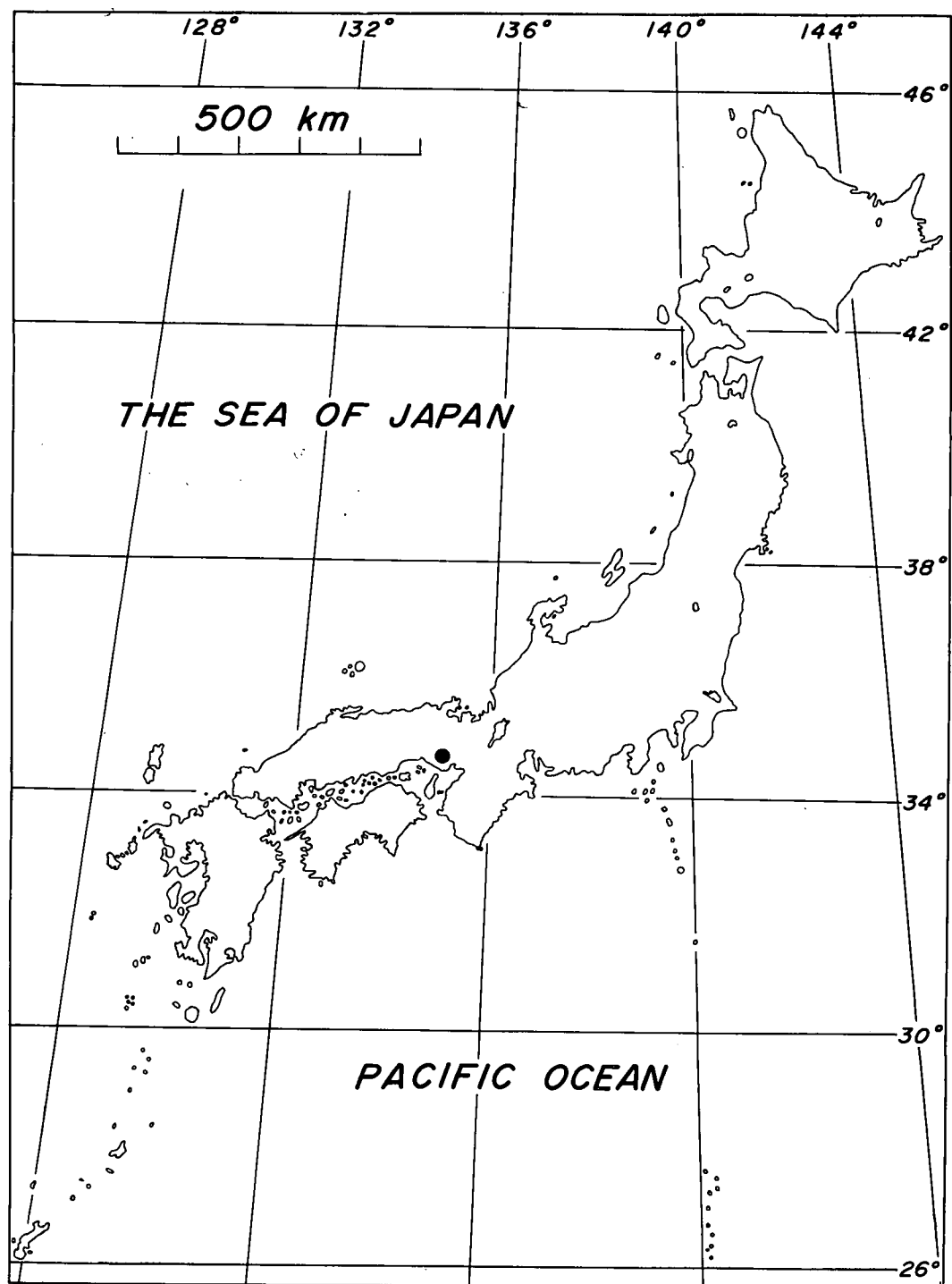


Fig. 16. Map of the Japanese Islands, showing the geographical distribution of *Sphalloplana* sp. of Himeji (ICHIKAWA et KAWAKATSU).

***Bdellocephala annandalei* IJIMA et KABURAKI, 1916.**

Pl. VIII-16. Large, 30 to 50 mm in length, and broad. Adhesive organ well-developed. Capsules spherical. *Japanese name* : biwa-ô-uzumushi, ビワオオウズムシ

Distribution : Lake Biwa-ko in Honshû. (Fig. 17-a and b).

Description : IJIMA & KABURAKI 1916. Annot. Zool. Japon., 9 : 157-159, Figs. 6-8 (original description) ; KABURAKI 1922. Jour. Coll. Sci. Imp. Univ. Tokyo, 44 (Art. 2) : 3-8, Figs. 1-2, Pl. I, Fig. 1 (re-description).

Bdellocephala annandalei is a true lake-dwelling species and will be found on the muddy bottom of Lake Biwa-ko.

Type-series. Holotype : lost. This species is common in Lake Biwa-ko (cf. KAWAKATSU 1964). Several sets of serial sections and whole mounts of this species are preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

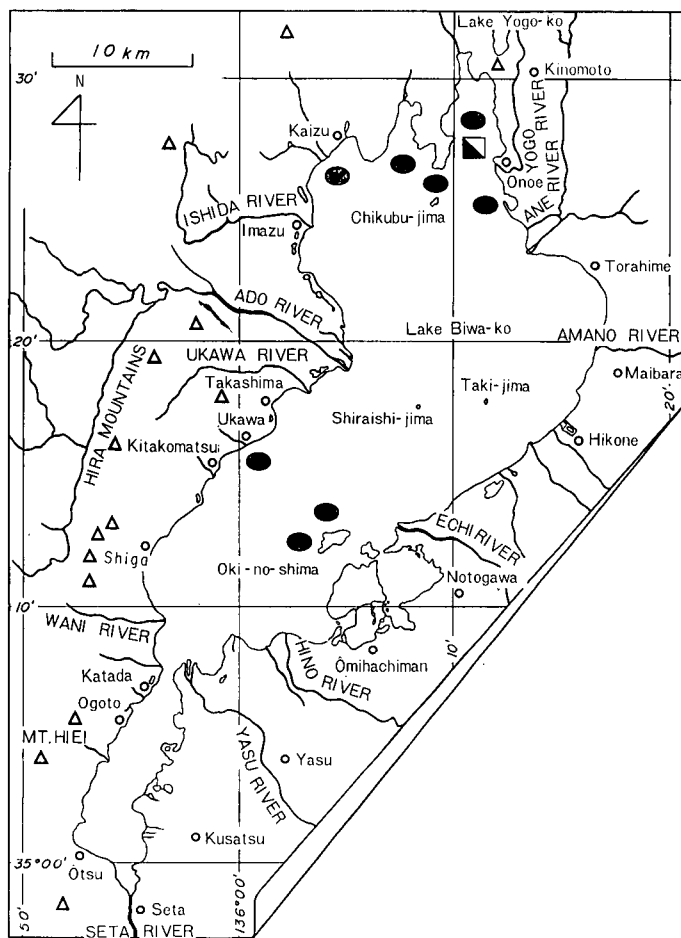


Fig. 17-a. Map of Lake Biwa-ko, showing the localities of *Bdellocephala annandalei* IJIMA et KABURAKI. Semi-solid square symbol shows the locality of *Dendrocoelopsis*? sp. of Lake Biwa-ko (modified from KAWAKATSU, ÔGAWARA & TARUI 1968).

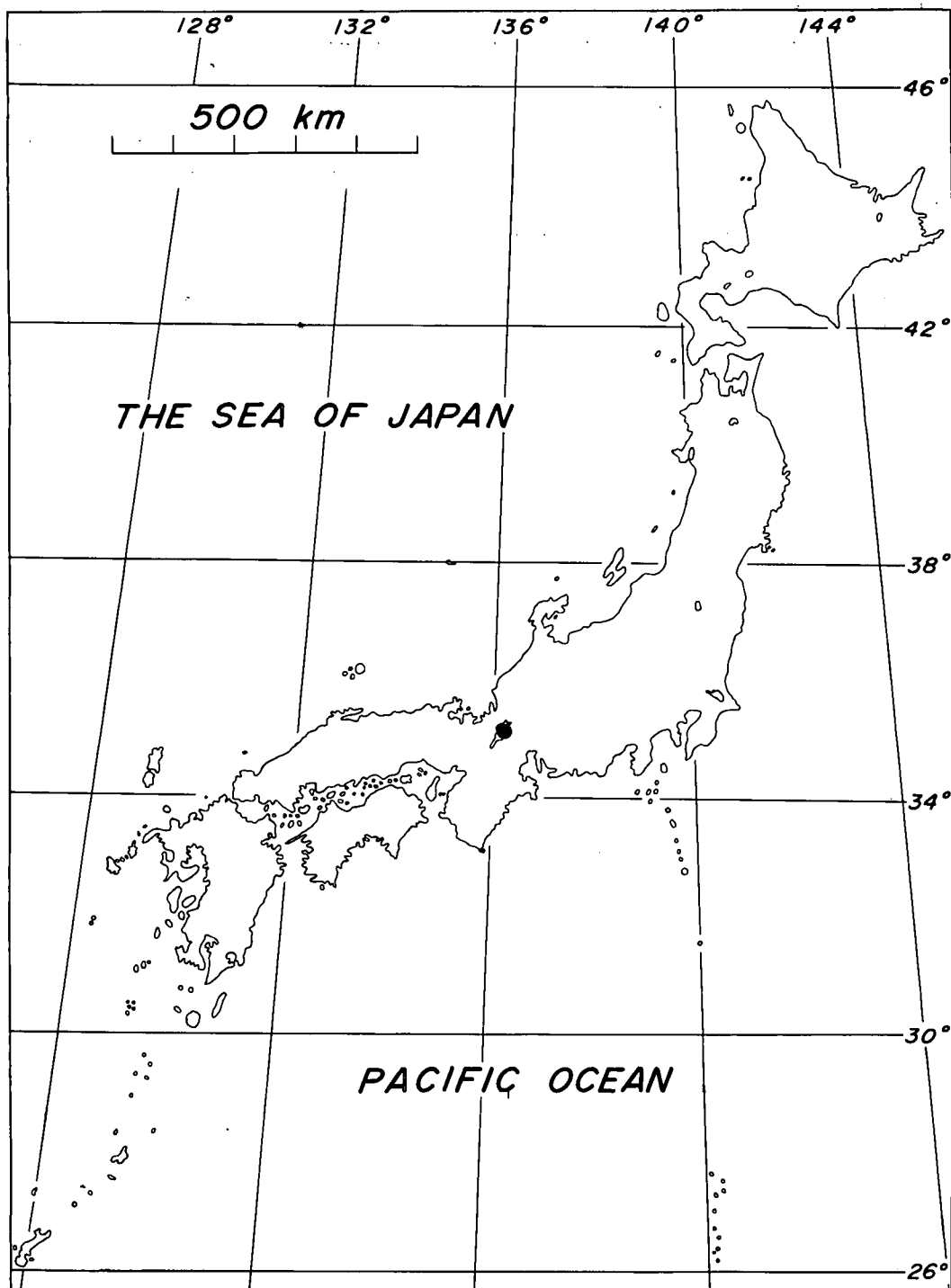


Fig. 17-b. Map of the Japanese Islands, showing the geographical distribution of *Bdellocephala annandalei* IJIMA et KABURAKI.

***Bdellocephala brunnea* IJIMA et KABURAKI, 1916.**

Pl. VIII-17. Large, 25 to 30 mm in length, and broad. Adhesive organ well-developed. Capsules spherical. *Japanese name* : izumi-ô-uzumushi. イズミオオウズムシ

Distribution : Middle and North Honshû (Fig. 18).

Description : IJIMA & KABURAKI 1916. Annot. Zool. Japon., 9 : 159-160, Figs. 9-11 (original description) ; KABURAKI 1922. Jour. Coll. Sci. Imp. Univ. Tokyo, 44 (Art. 2) : 8-12, Figs. 3-4, Pl. I, Fig. 2 (re-description).

Bdellocephala brunnea will be found in springs and ponds.

Type-series. Holotype : lost.

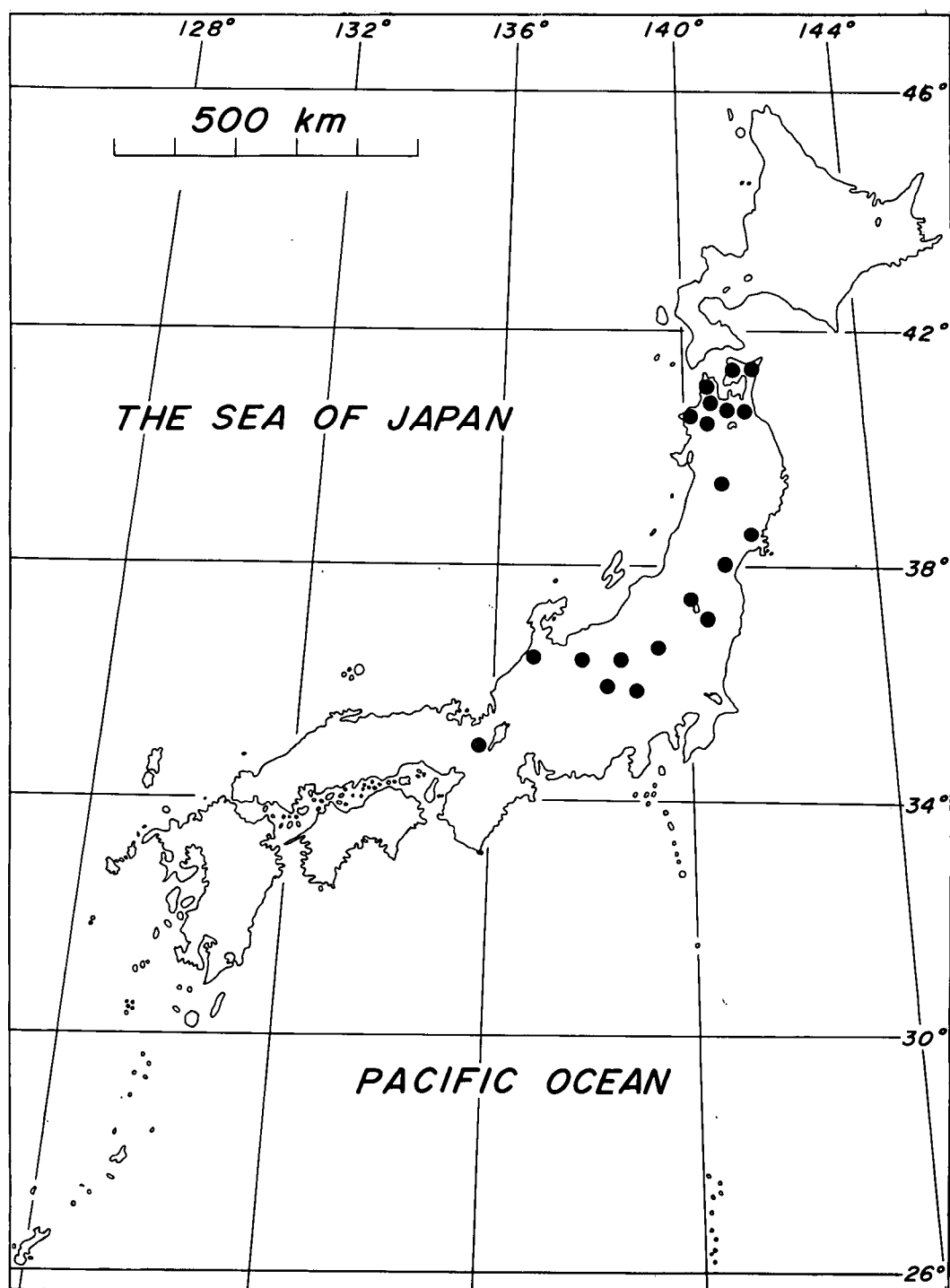


Fig. 18. Map of the Japanese Islands, showing the geographical distribution of *Bdellocephala brunnea*
Ijima et KABURAKI.

***Dendrocoelopsis ezensis* ICHIKAWA et OKUGAWA, 1958.**

Pl. VIII-18. Moderate, 15 to 25 mm in length. Adhesive organ well-developed. Capsules spherical.

Japanese name : ezo-uzumushi. エゾウズムシ

Distribution : Hokkaidô (Fig. 19).

Description : ICHIKAWA & OKUGAWA 1958. Bull. Kyoto Gakugei Univ., B, No. 12 : 12-18, Figs. 3-6, Pls. 2-5, Photos 37-112 (original description).

Dendrocoelopsis ezensis will be found in slowly running streams in the plains.

Type-series. Holotype : sections of the Sapporo specimen (Specimen No. 198 group) preserved in OKUGAWA's cabinet of Kyôto Kyôiku University in Kyôto ; also several sets of sections and whole mounts. Several sets of serial sections of the specimens from the type locality are preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

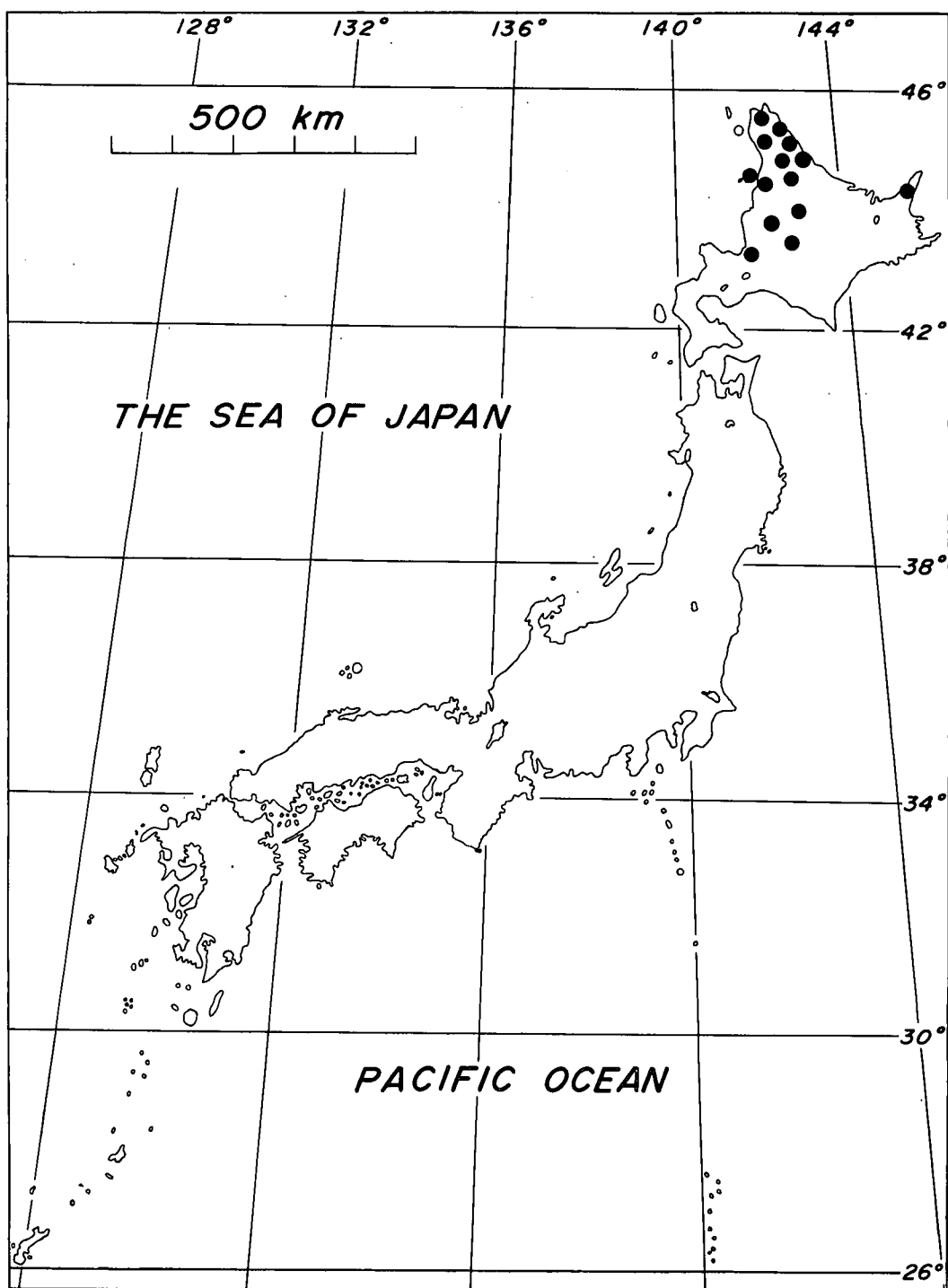


Fig. 19. Map of the Japanese Islands, showing the geographical distribution of *Dendrocoelopsis ezensis* ICHIKAWA et OKUGAWA.

***Dendrocoelopsis lacteus* ICHIKAWA et OKUGAWA, 1958.**

Pl. VIII-19. Moderate, 20 to 25 mm in length. Capsules spherical.

Japanese name : kita-shiro-uzumushi. キタシロウズムシ

Distribution : Hokkaidô and North Honshû (Tsugaru Peninsula and Kuroishi) (Fig. 20).

Description : ICHIKAWA & OKUGAWA 1958. Bull. Kyoto Gakugei Univ., B, No. 12 : 9-12, Figs. 1-2, Pls. 1-2, 5, Photos 1-36, 113 (original description).

Dendrocoelopsis lacteus will be found in slowly running waters and pools of swampy lands in the plains.

Type-series. Holotype : sections of the Sapporo specimen (Specimen No. 173 group) preserved in OKUGAWA's cabinet of Kyôto Kyôiku University in Kyôto ; also several sets of sections (No. 173 group). Several sets of sections of the Sapporo specimens (No. 129 group) too, preserved in the same cabinet. Several sets of sections of the specimens from the type locality as well as from the Wakkanai locality are preserved in KAWAKATSU's cabinet of Fuji Women's College in Sapporo.

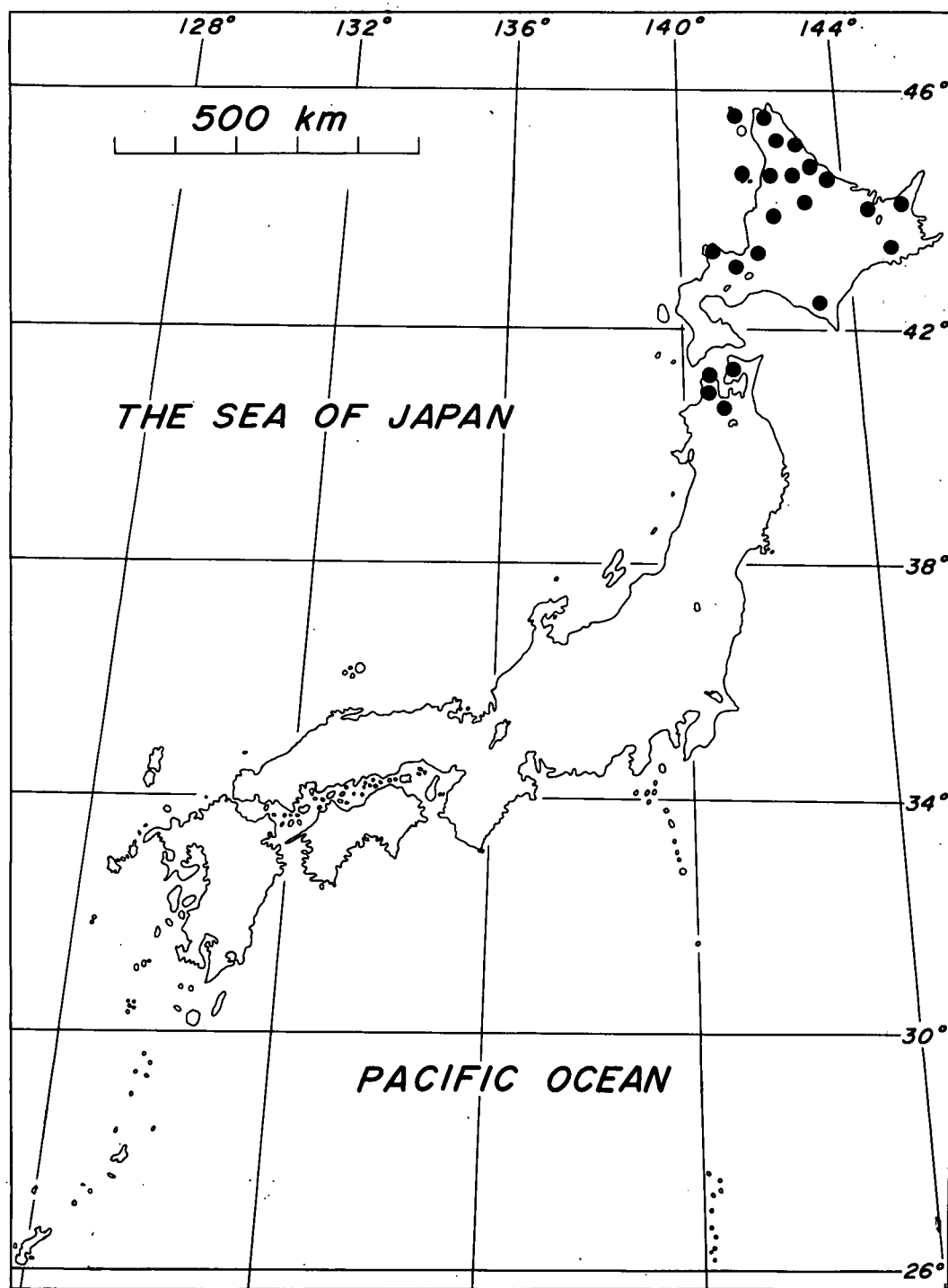


Fig. 20. Map of the Japanese Islands, showing the geographical distribution of *Dendrocoelopsis lacteus*
ICHIKAWA et OKUGAWA.

EXPLANATION OF PLATES VII-VIII

Plate VII

- 1 a. *Dugesia japonica* ICHIKAWA et KAWAKATSU. The Matsumoto stock (sexual race).
ナミウズムシ
- 1 b. *Dugesia japonica* ICHIKAWA et KAWAKATSU. The Kyûshû stock (asexual race).
ナミウズムシ
2. *Dugesia izuensis* KATÔ. After KATÔ 1943 and 1950. イズウズムシ
3. *Phagocata vivida* (IJIMA et KABURAKI). The Kyôto stock. ミヤマウズムシ
4. *Phagocata kawakatsui* OKUGAWA. The Kameoka stock. コガタウズムシ
5. *Phagocata teshirogii* ICHIKAWA et KAWAKATSU. The Hirosaki stock. トウホクコガ
タウズムシ
6. *Phagocata iwamai* ICHIKAWA et KAWAKATSU. The Wakkanai stock. エゾコガタウ
ズムシ
7. *Phagocata papillifera* (IJIMA et KABURAKI). The Mitsukaidô stock. カントウイド
ウズムシ
8. *Phagocata albata* ICHIKAWA et KAWAKATSU. The Toyotomi stock. ソウヤイドウズ
ムシ
9. *Phagocata tenella* ICHIKAWA et KAWAKATSU. The Hidaka stock. ヒダカホソウズムシ
10. *Polycelis auriculata* IJIMA et KABURAKI. The Kamikôchi stock. カズメウズムシ
11. *Polycelis schmidtii* (ZABUSOV). The Rishiri stock. キタカズメウズムシ

Plate VIII

12. *Polycelis sapporo* (IJIMA et KABURAKI). The Sapporo stock. キタシロカズメウズムシ
13. *Polycelis akkeshi* ICHIKAWA et KAWAKATSU. The Akkeshi stock. アッケシカズメウ
ズムシ
14. *Sphalloplana* sp. of Mts. Yatsu-gadake (ICHIKAWA et KAWAKATSU). The Yatsu-
gadake stock.
- 15 a. *Sphalloplana* sp. of Himeji (ICHIKAWA et KAWAKATSU). The Himeji stock.
- 15 b. *Sphalloplana* sp. of Himeji (ICHIKAWA et KAWAKATSU). Adhesive organ.
16. *Bdellocephala annandalei* IJIMA et KABURAKI. The Kitakomatsu stock (Lake Biwa-
ko). ビワオオウズムシ
17. *Bdellocephala brunnea* IJIMA et KABURAKI. The Hirosaki stock. イズミオオウズムシ
18. *Dendrocoelopsis ezensis* ICHIKAWA et OKUGAWA. The Wakkanai stock. エゾウズムシ
19. *Dendrocoelopsis lacteus* ICHIKAWA et OKUGAWA. The Sapporo stock. エゾシロウズ
ムシ

